

# AVIATION WEEK

A MCGRAW-HILL PUBLICATION

DEC. 26, 1955

50 CENTS



## No paper tiger

For keeping peace, some call our country a paper tiger. They err. Our strength, like the Navy's new F11F-1, is not on paper. This Tiger by Grumman is real. This Tiger is small and supersonic and will prey on enemies if attacked. To be ready in quantity when needed, Grumman designed and built the first Tiger in 15 months. Until Tigers join the fleet in quantity, Grumman Cougars will help the Navy police the sky and keep peace.

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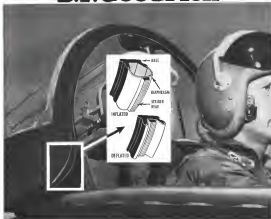
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CONSTANT SPEED DRIVES • AIRCRAFT ACCESSORIES

RESEARCH REPORT

# B.F. Goodrich

RESEARCH REPORT



## Low pressure seal prevents high altitude blowouts

FLIGHTS ABOVE used to face serious blowouts, trouble in high altitude crashes. The severe effect of high pressure inside the canopy, low pressure outside, would pry the inflatable and between the canopy and fuselage. Because this rubber seal had to stretch like a balloon to make an airtight fit—it couldn't take the strain. Positive pressure within caused the blowing up a paper bag—was needed.

B. F. Goodrich engineers developed a permanent inflatable band of rubber but only under low pressure without strain. A special rubber-corded fabric dis-

played it curved to a solid rubber base. When inflated, the reinforced fabric fits a "locking head" against the canopy inside in an airtight seal without stretching of the rubber.

The new inflatable strip seal works almost instantly. Even at minus 45° it retains seals low pressure than ordinary seals needed at zero temperature. There are other advantages. It means less weight and damage better than ordinary seals. It fits complex curves better. It seals and stretches better. Sliding wear and scuffing are eliminated.

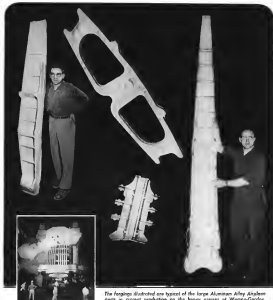
The new B. F. Goodrich seal is now

in use on more than two dozen military and civilian aircraft. The North American B-1 Fury, above, is one example. The B. F. Goodrich Co., Tire and Equipment Div., Akron, Ohio, is the manufacturer.



Other vehicle products • Big tires • Roadside service • Fuel cells • Airplane • Pressure • Sealing • Equipment • Information • Products • News, literature





The forgings illustrated are typical of the large Aluminum Alloy Anghem parts in current production on the heavy press at Wyman-Gordon.

A new era in the art of forging has been demonstrated as production goes forward on this 35,000-ton closed die forging press. Larger forgings with thinner sections and closer tolerances than heretofore possible open new concepts in forging design. Wyman-Gordon continues to pioneer by — Keeping Ahead of Progress.

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## A Message From the Publisher

Aviation is completing its most successful year. Building and maintaining the strongest military airpower is an integral part of national policy. Air transport expansion continues at a record pace. Business flying is the most rapidly growing segment of civil aviation. Technical progress has opened the realm of super sonic flight and a pond on the threshold of space.

Aviation Week's growth during 1955 also established new records for aviation publications in editorial impact and readership, paid circulation growth and advertising acceptance. Under the leadership of its editor, Robert H. Hott, an expanded editorial staff set a new standard of reporting the every facets of the industry's technical, financial and political growth. Its exclusive editorial content was widely used by the management of airlines, aircraft and aviation manufacturing firms, engineering staff, legislators and military aviation officials in the conduct of their business.

### Editorial Impact

Aviation Week's exclusive editorial report on the growth of Russian jet airpower and its impact on American military planning was quoted authoritatively on the front pages of 227 American newspapers and translated into four foreign languages. It stimulated editorial comment in 113 daily newspapers and by nationally syndicated columnists, television commentators and radio broadcasters. It was widely credited with influencing a major change in military policy, resulting in an accelerated aircraft production program and an expanded research and development effort. During the year, AVIATION WEEK was authoritatively quoted in military newspaper debates on the floor of the U. S. Senate and the British House of Parliament.

Among other major stories of the year brought exclusively to AVIATION WEEK readers were the first complete and accurate account of the new life support systems: technical breakthrough by scientists of the National Advisory Committee for Aeronautics, new Air Force procurement, research and development policies, the development of a new atomic weapons system, and full-scale engineering aspects on the new jet transports—the Douglas DC-8 and the Lockheed Electra. AVIATION WEEK's editorial coverage expanded into the new fields of missile engineering, human factors and astronautics. It also provided the aircraft industry with a new service by publishing the first annual Buyers' Guide containing 596 pages and 37,000 product listings. Our editorial staff was augmented until it now contains the largest group of engineering writers and graduate engineers in the aviation publishing field. Key editorial bureaus in Washington and Los Angeles were also enlarged with experienced aviation reporters.

This editorial expansion program is still under way. During 1956, it will bring our readers a new format

designed for easier readability, editorial covers and continued expansion of the new technical fields into which aviation is spreading. AVIATION WEEK is now being printed on new high speed presses that enable us to produce the magazine faster.

### New Advertising Peak

I believe AVIATION WEEK readers would also like to know something of the tremendous advertising record completed during 1955. We published 4,298 pages of advertising during the year, representing an increase of 776 pages over 1954. This gain represented a total larger than the combined increase of the next three major aviation publications. Once again, AVIATION WEEK is represented by an expanded position in the select group of the nation's 25 largest magazines, a distinction that no other aviation publication has attained. This acceptance of AVIATION WEEK by the aircraft industry is the result of a firm, independent and vigorous editorial policy which has attracted the largest net paid audience of engineering, management and military subscribers in the aviation industry. Our net paid circulation as reported by the Audit Bureau of Circulation for the period ending June 30, 1955, stood at \$1,885. Our current net paid is \$5,190. We will continue to expand circulation during 1956 to reach engineers, scientists and top-level management of the new firms being drawn into the aviation market by their special technical skills.

### Expanding Industry Prospects

Our research indicates further expansion for the aviation industry during 1956 and a continued period of growth extending at least until 1960. An increase of \$1 billion in Fiscal 1957 defense expenditures over the \$36 billion spent during Fiscal 1956 will be devoted almost entirely to aircraft, missiles and guided missiles. New money requested for Fiscal 1957 will increase by \$2 billion, most of it earmarked for aerial weapons. Close to \$25 billion in federal funds is now available for the aircraft, missile and missile programs. Combined with the increasing demand for new type airline firms and executive planes, the military program will keep the manufacturing industry operating at peak production with greatly expanded research and development efforts. Airline projects, stimulated by the jet-transport development and a federal regulatory policy favoring growth, also appear bright for years to come.

Expansion of the aircraft industry has brought a new challenge to its management and technicians as well as to the aviation publications that serve it. AVIATION WEEK will continue to expand its activities and to explore new possibilities for providing better service to both its subscribers and advertisers.

—Robert W. Martin, Jr.





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## Washington Roundup

### ATA Opposes Free Riding

Civil Aeronautics Board's proposal of free advice rules for staff members has been rejected by the Air Transport Association. Individual ATA member carriers have been equally emphatic in their opposition to "free loading" by CAA.

ATA president Stuart C. Tipton informed the Board last week that "the industry feels still unable to endorse the proposal." He said the industry agreed with the idea and supports the objective of providing an opportunity for members of the Board and for qualified personnel of the Board's staff to become better acquainted with the day-to-day operations and industry problems.

Tipton emphasized, however, that there is total disagreement with the procedures being proposed by CAA. He said the airline industry is extremely apprehensive over any proposal that expands the staff within which free or substandard transportation can be provided, particularly so concerning air personnel costs.

The Board's "free loading" policy was likened to a freedom's bus. Tipton said the airlines feel that "adoption of CAA's proposal would not only share the door open wider than previously to cover the Board's objectives, but would almost certainly create demands for similar privileges from other groups—demands which CAA would find difficult to resist and which, even if resisted by the Board, would be renewed in the Congress."

### Profits Investigation

House Armed Services Investigating Subcommittee has completed its study of military aviation procurement policies and profits. But public hearings probably won't start until the second week of January. The study starts with the calendar year 1951. Reauthorization Board has completed its review of contracts up to then.

The tentative plan is to call in defense manufacturers first, one by one, and then proceed to aircraft engine and parts manufacturers.

### Godfrey's Recommendations

One of the wisest contributors for a title as advisor to the Defense Department is Arthur Godfrey, radio and television star, an aviation enthusiast. Defense Secretary Charles E. Wilson candidly offered a friend, but he backs with a cold eye on his recommendation that the Air Force be reorganized, then listed with 1,109 B-52 jet bombers to replace the B-36. The latter, Godfrey said, is his machine appearing in the Saturday Evening Post. "Should have been putted off somewhere on the fence long ago and acted." Commented Wilson on Godfrey's suggestion: "Good Lord, protect me from my friends. I can look after my enemies myself."

### Small Business Hearings

Deadline in the shape of defense contracts for small business from 21.1% in Fiscal 1954 to 23.8% in Fiscal 1955 has triggered hearings scheduled to start Jan. 8 before the Senate Small Business Subcommittee on Military Procurement to discuss the reasons.

Sen. George Stanford (D-Ill.), subcommittee chairman, said that although Defense Department has issued numerous policy directives to increase the participation of small business in defense work over the past year,

effective implementation of these directives at the operating levels seems to be lacking.

### Wilson's Mistake

Defense Secretary Charles E. Wilson not only admits, but declares he says made a mistake in judgment in the atom-powered engine. Finding the project promising today because of technological advances, Wilson doesn't see how called it a "moon airplane." Indeed, he says "I said it was a shipwreck. That's a great big load that sits over the machine, that doesn't have much load on itself, so it's not it can fly." Now, Wilson says, the atom-powered plane looks better than a dirigible, the American goes faster. Development is being pushed in the Fiscal 1957 budget.

### Airpower Positions

Staff study of the world level of armaments, country by country, will be presented to the Senate Subcommittee on January 15 at its first meeting in January. The study is extremely limited, staff members said, because it is based on public information.

Subcommittee chairman, Sen. Robert Taft (R-Ohio), points out that the relative military position, particularly with respect to air power, must be known, before defense proposals can be considered. He says an expert study is the country's need. A by-product of these will be to supply background for other committees evaluating the adequacy of the U. S. defense effort. Membership on the subcommittee subcommittee includes former Vice President, Sen. Aiken (B-Me.), majority leader, Sen. William Knowland (R-Calif.), House Armed Services Committee Chairman, Sen. Leverett Saltonstall (R-Me.), former Air Force Secretary, Sen. Stuart Symington (D-Mo.).

### Lee Ouster Reasoning

A new reason for the ouster of Fred B. Lee as Civil Aeronautics Administrator is advanced by Rep. Robert Molloy (D-N. Va.), Chairman of a House Government Operations Subcommittee.

Lee failed in forming opinion of CAA's telephone conversations with and to private interests, according to Molloy, and, instead, supported continued Government operation as "efficient and economical." In response to a request, Lee wrote Molloy on Oct. 25 pointing out that CAA's extensive operation of the system since 1911 was established by statute made in 1942 and in 1952. Molloy replied.

"Despite these findings, in January, 1955, the Under Secretary of Commerce for Transportation and representatives of American Telephone and Telegraph Co. to Lee to solicit consideration of a proposal to turn over to private ownership, equipment to those of the four CAA-operated circuits. Meetings were held by CAA with officials of A. T. & T. and Western Union in March. As a result of these meetings, which the Department of Commerce apparently based upon CAA officials, the CAA has been actively working on the required specifications to accompany the advancement for bids."

"It is not unreasonable to conclude that Mr. Lee's ouster was dictated in part by his position as the sole of the CAA telephone system at the expense of the American taxpayer."

—Washington staff



for new transport aircraft, deliveries of jet transports will not start until 1953. Completion of certified orders for postwar aircraft will keep production at a high level until delivery of subsonic and supersonic transports are started.

The aircraft industry ended the year as the nation's second largest employer, among manufacturers behind the auto, mobile, electronic. Employment was stable during the year with an average of 750,000 persons being employed monthly in the aircraft industry. Total wages in 1955 will exceed \$4.1 billion. The close and reliable supplies of large subsonic and supersonic. In addition, these nations would have put the aircraft employment over the 1 million mark. The automobile industry employed 910,000 persons during

1955. Weekly wages increased from \$3.88 in 1954 to \$5.19 in September 1955.

Ordnance is first wages will continue to rise.

Aircraft industry is the nation's largest employer of engineers and scientists. Out of over 100,000 scientists in the industry engaged in engineering activities, concerned with a 1 to 35 ratio in World War II.

Other AIA predictions:

- Additional wings of high speed, heavy jet bombers will be added.
- Substantial deliveries of the "cruise" series of supersonic fighters will be made and the Navy and Marine will receive supersonic fighters.
- More powerful jet engines will be delivered in quantity.

## Burke Says Russians Seek to Control Sea

Washington—Nuclear power, nuclear warheads, guided missiles and supersonic aircraft make naval warfare more important to free nations than ever before in history, Adm. Arthur Burke, Chief of Naval Operations, said today.

Russian submarines, said Burke, and has become the second leading sea power in the world, and still a growing rate. He pointed out that the Soviet Union, with 1,000 submarines, Germany started World War II with 37.

"The Soviet Union believes that control of the sea is absolutely essential to success in war," Adm. Burke said. "That is why the Soviet Union is expanding so much of her national effort to build a navy—a navy which is designed to prevent the United States and the free world from using the sea over the Russian continent."

"That is why she is laying as much stress on Naval aviation. Only recently we learned from Red Star that the Soviets were publishing the operations of their aircraft and their submarines."

That is why the Soviet Union is emphasizing the development of the submarine—and the modern bomber to carry them. That is why she is developing guided missiles so she can destroy our oceanic ports, our command bases, our supply dumps overseas and our ships that attempt to reach overseas ports."

To meet this threat, Adm. Burke said, our Navy is seeking nuclear propulsion and "backpack" powered submarines. Burke said the U.S. must not only be ready to make long-range atomic torpedo attacks on enemy navies but they will be capable of taking enemy submarines, of preventing enemy warships from coming within attacking by air and sea.

"We will be capable of finding and supporting amphibious, of landing Marines on hostile shores, of launching guided missiles against targets on land and on the ocean's horizon. All of them will have to be more capabilities. All will be multi-purpose."

The Navy Chief of Operations said he does not believe Russia is building an aircraft carrier, as recently reported in the press. He said the Red emphasis is on an aircraft carrier to combat atomic vessels of the free world and that they have little or no use for an aircraft carrier.

Adm. Burke, a key figure in the 1949 Navy fight against USAF plans to buy the B-36 bomber, who was asked how the United States could carry out its massive retaliation policy today if the long-range bomber is destroyed and being modified. His reply was that USAF probably would have stepped up the B-47 and B-52 programs.

## Industry Faces Army Aviation Challenge

By Claude Wines

PHILADELPHIA, Ala.—The American aircraft industry has been charged to develop and produce a new family of "armored fighting vehicles."

Rep. Gen. Carl E. Hutton, commander of the Army Aviation Center here, says the Army of the future will be airborne, but not another Air Force. He goes the aircraft industry at least 10, but not more than 15 years to make this possible by meeting the urgent need for increased mobility.

Fully cognizant of the present state of the art, Gen. Hutton says the Army needs three "armored fighting vehicles":

• A landing vehicle. This will be a reconnaissance airplane, much faster than the present L-19 but not displacing USAF reconnaissance equipment and too long-range missions.

• A firing vehicle. This will be used to hold an enemy in position, such as artillery fire is used to hold him down for the kill. Sometimes the firing vehicle, like the artillery, will perform the kill.

• A destroy vehicle. This will be a heavy fighting unit, comparable to a tank in its armor and firepower.

All of these new "armored fighting vehicles" must be armored.

"The aircraft industry must do this job for the Army because the very existence of our ground forces now depends, predominantly, on their ability to get off the ground. It has been demonstrated, most recently in Europe, that armor support can make certain, basic, battlefield and mobility impossible."

### Basic Differences

Gen. Hutton is a trench speaker for Army aviation. "Obviously," he says, "we do not have an aircraft within the Army capable of making revolutionary tactical changes. What is needed is a new element of our military requirements upon which the aviation staff of industry can work. This type of thinking is extremely difficult since our minds are constructed by the framework of existing aircraft types."

Here Gen. Hutton and other Army aviation enthusiasts met privately with aviation head officers of the ground forces. His approach and the demand on industry to develop a new vehicle make the aviation challenge clear. The conflict with the Air Force is between USAF and more conservative Army interests.

The letter has not received from the Army that they now had wings, never received from their organization and put under the Air Force. Gen. Hutton says.



Rep. Gen. Carl E. Hutton, 45, graduate West Point in 1910, issued in 1945. He was first sent as an artillery and reconnaissance officer. A return of the Air Force and Navy movements in 1945 in the Korean war, he was appointed commander of the Army Aviation Center here in 1945. He is now at the Air Force School at Ft. Belvoir, Ill., as the new Army Aviation Center.

other speakers for the Army Aviation Center profess an urgent need for change. They do demand the right to let Army mobility catch up with modern firepower. Valid to this, they say, is the "armored fighting vehicle."

Gen. Hutton defines the role: "Remember the Army has tended to consider itself as a means of transporting the soldier to battle. This has been comparatively little development as the need of using mobile fighting vehicles."

The distinction between the two is fundamental. As an airplane is a piece of transportation, it would logically belong to a transportation corps. As an airplane is a fighting vehicle, it would logically belong to the combat corps. The Army is in a part in one case we would have as an untransported Army, and in the other case we would have an untransported Army.

### Proof in Baghdad

The concept, in Gen. Hutton's opinion, had its origin in Korea. There, he said, the Army was stuck because the CG was abandoned by our units to use our technology to help him. The soldier was still dead or became prisoner untransported soldier."

With atomic shells, the situation is worse instead of better. The position is a statement at issue. Gen. Hutton says.

"Men still walk at about 14 mph across country, and truck-borne soldiers have about the same speed when they are in World War II. The 60 mph truck has not been a distinct factor because the places in the world's surface where such speed across country is possible are extremely rare."

Gen. Hutton's statement offered definite proof of this point. The Louisiana maneuver, where 150,000 troops and more than 2,000 vehicles took up and down the Louisiana swamps for as long as 10 days, would have been a heppish disaster if the atomic weapons had been used, not mentioned.

It was clear that atomic weapons could cripple ground troops as well as their supporting Air Force. If the men are not killed their armored vehicles would be bogged down on impassable terrain. When mobility was not provided by nature would be put there by the enemy.

While the most conservative Army officers accept mobility and disposition in the best defense against atomic attack, they did not pass their case in Louisiana.

Limited road running in one direction, lack of adequate roads and swampy terrain made it clear that the Army could be trapped.

### Independence of Terrain

It was equally clear that we have no means capable of conquering with the situation, flown by the Army or the Air Force.

Now power is coming, Gen. Hutton says. The aircraft industry must find a way to let the Army trade speed and firepower for heavy armor and use the "armored fighting vehicle."

It is needed, he said, to even fighting levels of the Army's Tanks.

### Air Pilot Training

PHILADELPHIA, Ala.—The Army Aviation Center here is the home of the Army Aviation School, with a staff and faculty of 500, where pilots learn how to fly light planes and helicopters the Army way.

Courses are given in tactics, instrument flying, two engine operations, helicopter flight and engine helicopter operations. These are 754 students. Most of the 1,000 students are pilots. Rep. Gen. Hutton is the director of the Army Aviation School in the Postage. The second general aviation effort to get his wings, Gen. Hutton is a model student.

portation Corps, Artillery, Infantry, Avionics, Engineers and Signal Corps. All need "flexibility to move independently of the mass," he said.

Gen. Hutton added, "Really great increments in mobility do not appear possible so long as the fighting vehicle has to move through uncontrollable terrain, obstacles, plagues, and potholes and rivers. On the other hand, fighting vehicles which can move through the air are not impeded by obstacles or terrain."

The price of the soldier across the earth may be measured a hundredfold, or two or three hundredfold, if he can move in the air above all obstacles."

#### New Evolving Types

Here Gen. Hutton calls on the new military technology.

"If this method of looking at present military history is valid, we should begin immediate experiments in determining the extent that air fighting capability will balance atomic firepower."

Gen. Hutton returned to American

Warfare that he is at no point talking about creating models.

"Nobody," he said, "is very sure what subjects could produce if we told them what we need on the battlefield. It will take 10, maybe 20 years, to develop these experiments."

It must be pointed out that no existing type of aircraft appears to be suitable for the Army's new air fighting vehicles.

"Scientific knowledge, however, has been moving at such a rapid pace that either an aircraft or a launch of aircraft in which the Army could fight may be possible."

Just last in 1955, Gen. Hutton said, is the STOL (Short takeoff and landing) aircraft (A-10, p. 25). But that still is far from the ultimate answer.

#### Power Unit Key

As in the race of early aeronautical advances from the Wright brothers to jet propulsion, the answer lies in improved power units. Industry experts

say they could build reconnaissance aircraft, aerial tanks and personnel carriers that would meet Army requirements.

The trouble is that meeting the short takeoff and runway requirements will leave no lifting capacity to carry soldiers.

Consistent with the history of aeronautical advances, the search is on for a power unit that will make the Army's "small fighting vehicle" a reality. Most promising, industry observers say, are nuclear propulsion and rocket engines. The latter are most advanced, provide tremendous thrust as a maneuverable package, but are in limited development.

Gen. Hutton is concerned by other recent developments, such as the Lockheed and General VFW experiments, the Hiller flying platform, the vertically-taking-off airplanes that utilize boundary layer control and other experimental aircraft.

He is optimistic about the future. Such developments, in addition to what has gone before in the way of fixed-wing and helicopter technology," he said, "make it appear that the field of aeronautical technological growth now offers the possibility of a vastly increased number of combinations."

"In the opinion of the industry, the state of this art developed to the point where a technological breakthrough could be possible."

#### Projects Under Way

The search continues is not blind to the Army's challenges and work is going forward in the research offices of both rotary and fixed-wing manufacturers. In addition to projects under way for the Air Force and the Office of Naval Research, there is a large number of privately-financed programs.

These are being pursued by Fairchild, Stoddard, Wright Aircraft Corp. (A-10, p. 24), a J-10 and others. Charles Zimmerman of National Aeronautics Committee for Aeronautics is contributing to the developments.

On one point Gen. Hutton is adamant. The USAF Army 1952 Memorandum of Understanding, he said, depicts the Army as freedom it needs to sponsor development of "small fighting vehicles." The \$100 million loan on Army aircraft still have to go, he says, and the entire paper committee to his instructions now regarding the Army's progress.

Gen. Hutton would make a distinction between interdiction and close support, giving the former primacy to the Air Force.

Close support, he said, "is an integral part of the ground battle, and it must be completely responsive to the will of the command."

"Confusion and bickering have marked attempts to make the present

system work. A revision of the mission to confirm the Air Force's dominance in the interdiction role and to establish the Army's dominance in the close support role would end the confusion and bickering."

All this in the opinion of competent military and military observers, is a far cry from a meeting of the 1953 memorandum and the real future where the issue will be resolved on a Campaign.

Before that issue the Army will demonstrate its own future. If it can be handled with skill by well-trained officers who can make clear the distinction between support and "fighting soldier," then will we support in the Field 1957 budget.

#### New Reconnaissance System Announced

A new super-sensitive, night-time aerial reconnaissance system, reportedly capable of providing a clear, sharp picture of ground activities "under the most lighting conditions in sight," has been developed by USAF's Wright Air Development Center.

The system, called "cat eye," resembles a closed-circuit TV, employing both a television type camera and a cathode ray tube viewing screen. However, it is reportedly 1,000 times more sensitive than a conventional type television camera.

The basis of the system is an "optical amplifier," which provides a means to sense in contrast ratio between varying shades of gray and black.

Flight tests as an experimental system, a Wright spokesman said, showed that "airborne observers were able to see the ground clearly on a moonless, starless night." Westinghouse Electric Corp. and the Radio Corp. of America presently are developing improved models of the optical amplifier. ARDC says the device is expected to become as available as jet night-time aerial reconnaissance.

A photoelectric cell is used to convert the available light into electrons, which in turn are converted and used to produce electrostatic charges on an intermediate screen or plate. Here the signals are amplified, to increase the contrast ratio between varying shades of gray, and then sent by an electron beam which is exploited to produce a signal which is displayed on a cathode ray tube.

The system appears to be an adaptation of image type cathode ray technology which RCA and others have developed for other uses.

The original WADC development was carried out by the Physics Branch of the Aeronautical Research Laboratory.

#### Largest Helicopter Makes Record Lift



JET POWERED HO4S developed by the Aircraft Division of Hughes Tool Co. gets ready today to lift a USAF truck, via, in just about one to be carried by a helicopter. Truck pushes the car onto position between the HO4S's rotor legs . . .



AND THE WORLD'S LARGEST HELICOPTER picks up its record load and flies away. Hughes officials say helicopters of the new design could carry 30 tons loads, including boats.



New Helmet by ARDC

M&I helmet and attitude suit are new items of personal flight equipment developed by Air Research and Development Command. Oxygen mask and meter have been removed from cockpit plate. Components of radio helmet, and attached to base of M&I flight helmet. New transparent visor is such wide, permits a broader range of lateral and downward vision. Visor is designed by heat treating elements.

## Boeing Reveals Noise Suppressor; Port Authority Stresses Urgency

By Henry Latzer

New York—Boeing Aerospace Co. last week announced that the "noise" problem of jet engines thrust reversing and sound suppression have been overcome through its anti-developed noise-suppressor. However, the New York Port Authority—whose job against jet transports has gone negative to the demand for finding an effective solution to the noise problem—remains skeptical.

While conceding that Boeing's response may be a step in the right direction, Port Authority officials believe there is still a long design and development road ahead.

The authority is caught in the middle of perhaps the most difficult noise case to resolve in the country. Its four airports—Newark, LGA/Garden, Idlewild and Teterboro—handle about 1,000 landings and takeoffs on an average day. On a peak day, LaGuardia alone may handle 1,000 movements—an average of about one every 45 seconds and actually a much higher rate during rush periods.

### In the Middle

On the authority's one hand are the hundreds of millions of dollars now invested in the purchase of jet transports and the peak of progress in engine development.

On the other is local opposition to the noise and possible danger of the heavy air traffic, which has crystallized in the form of local pressure groups, such as the one in the Bronx—Elmhurst, N. Y., and in local audiences bearing loss living, such as that posed by Colonel L. I., N. Y. The Col-

umbus has been upset by the Eastern District Federal Court, but it is being appealed.

Latest, and perhaps most dangerous, move in the contest among the New York area is a bill being prepared for the legislature at New York State's upcoming legislative session. This bill would ban jet transports from New York airports for the next 10 years.

The Port of New York Authority is an autonomous institution set up by the states of New York and New Jersey. Nevertheless, it is subject to the control of the governors of the two states, who can create an advisory board into the members of the authority's members, thereby tying its hands if it is not responsive to their demands.

The governors of the two states, being elected officials, are extremely responsive to the demands of voters.

Members of the New York airports is not of the question, the Port Authority says. Suitable land is not available. Furthermore, the investment in ground facilities for aircraft that is already made and if any change is made, it should be made in the planes, aircraft of the authority's control.

As an example, by October there was more than 312 billion invested in the 112 airports used by the nation's scheduled airlines. The capital investment of the aircraft in equipment was about \$1 billion. Approximately the same rate has been mentioned in an independent study.

The group, which is well known expert, who will lead extensive of research at most airports. Therefore, Port of New York Authority spokesman says, it is the responsibility of the indus-

try itself to give the new jet the capability of operating on today's runways and quiet enough to still the public outcry which is sure to be raised against these noise.

The jet noise problem was, for some time, dominated by almost everyone. The airlines said, "Let the airlines worry about it." The airlines tended to back the priorities to the airports. And the airport operators had to face the angry public. However, all these connected with the problem now appear to have a better understanding of the situation, probably sparked by such means as the Port Authority's flat ban on jet operations at New York civil airports.

### Boeing's Suppressor

Both Douglas and Boeing are hard at work on the design of suitable noise suppressors and thrust reversers, of which the new Boeing development is the latest to be disclosed. It is understood that this project is receiving top priority at Boeing United Aircraft, where Pratt & Whitney Aircraft Division makes the J57 and JT3A engines for the new jet transports, also is pushing hard for a solution, as is the National Advisory Committee for Aeronautics.

Boeing's noise suppressor is said to create no appreciable reduction in the total available engine thrust. It has been subjected to full-scale tests on the 707 jet prototype. The Port Authority, however, maintains a "show me" attitude and is waiting to see a set of test results showing on a jet transport.

All the above purchases of new jet equipment have stipulations concerning noise in their contracts, but the stipulations are generally vague, requiring the manufacturers to keep noise at a "reasonable level." What this "reasonable level" is, no one seems prepared to say. The subject of what type materials, pitch, etc., at noise is increasing in harmful still requires considerable study. The consensus seems to be that if the jet will be no noisier than today's DC-7s and Super Constellation, the industry may get by. However, with the expected growth of air transport and the already-potential opposition to the situation as it is today, the Port Authority is not convinced that this noise level will be acceptable.

A meeting, to investigate jet problems will be held in Washington next week (Nov. 10-12), bringing together representatives of the airline industry, the Civil Aeronautics Administration, the Airport Operators Council and the Air Transport Association. The Authority hopes that this meeting will settle work on a series of noise standards to be applied to jet operations.

In the meantime, the Port Authority stands in its 1951 law which has prohibited the takeoff and 707 from landing in New York.



**THREAT REVERSED: NOISE SUPPRESSOR** produced by Boeing Co., the Port of New York Authority believes, the first step in the quiet aircraft. Forward shown is an experimental version which has been test-tried on the 707 prototype at 50 mph.



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The Government Products Division of Rheem is presently in quality development and production on air frames, missile and jet-engine components, airborne ordnance, electronics and guidance systems.



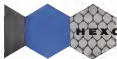
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**BLASTED OUT** into supersonic altitudes, acid and flaming rock formed, followed, upon sideways and tumble rolls.

## Rocking, Not Tumbling, Is Bailout Hazard

Pilot in panic during a high speed test out one now believed to result from a violent series of rocking and yawing motions, rather than from complete roll motions in tumbling. These wild motions cause hemorrhages from blood pouring and broken arms and legs from falling limbs.

Two new contributions to the solution of ejection problems has been made by North American Aviation engineers, in promising to duplicate the escape of NAA pilot George Smith from an F-100 Super Sabre (AV News 34, p. 14).

A series of test runs was made at Edwards AFB, Calif., approximating the same forces that battered Smith at 777 mph and 6,500 ft altitude.

An anthropomorphic dummy was formed and dangled to duplicate Smith as he was on the day of the accident. Accelerometers inside the head and torso telemeasured G loads in horizontal, vertical and lateral directions.



**DEAD DUMMY** is examined after ejection test simulating supersonic bailout.



CONVAIR F-102A escape system is checked out before high-speed test of dummy pilot ejection and test separation.

### *Dummy Tests on Sled Mockup of Convair's F-102A Give Researchers*



TEN SOCKETS drive the sled for dummy man on the high-speed track at Edwards AFB, as crews in uniform may be used.



CANOPY RIPS OFF at start of ejection sequence and . . .



DUMMY PILOT and seat start being set off canopy.



FORWARD ROTATION begins as height increases and . . .



BUILDS UP, stabilized by the falling ejection seat.

### *New Design Data for Advanced Supersonic Ejection System*



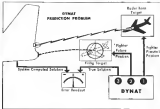
SEAT SEPARATION seat parachute deployment on automatic rail . . .



DUMMY LANDS with full open canopy.



## AVIONICS



## General Electric.

By Philip J. Klum

Two major producers of bomber defense armament systems recently opened new general test facilities designed to check the critically important electronic accuracy of their radar-directed fire control system under simulated airborne combat conditions.

General Electric's Aircraft Products Dept., Johnson City, N. Y., has a new facility where overall directional accuracy of a fire control system, including gun firing, under fully simulated flight conditions such as vibrations, extreme temperature, day-over or target extinction, windloads and noise levels are

controlled simultaneously—  
—in 90°C.

The General Electric Aircraft Products Dept. Tester shows passing data rates. Based on computer calculations, it can compare a considerable number of parameters during the building of a gun turret. During an actual test run,

This photo-



## Control Systems

The horizontal and vertical position of the radar target or effector is viewed in accordance with nominal signals presented by a set of "present position" cues.

By choosing these cues, it is possible to change the visualized course flown by the attacker.

In actual practice, to permit the use of a narrow field chamber, the radar target remains fixed in azimuth while the platform mounting the rail target package is rotated in azimuth. This creates the same effect as if the target were moving.

### Computing Future Position

The fire control system computes all

## Dr. Philip J. Klum

General Electric's Aircraft Products Dept., Johnson City, N. Y., has a new facility which checks dynamic accuracy of a fuel control system, including gas firing, under full simulated flight conditions such as vibration, extreme temperatures, on-own or target motions, windloads and take noise.

<sup>12</sup>This may explain the rather phenomenal success we've had in shooting down target drones," a GE spokesman said.

The only other flight test alternative is to use view, uncalibrated flow, height or exposure devices.

Possible, the most significant of these new advantages is the accuracy obtained. "Dyeing permits complete eradication of a free residual water to an accuracy improving first possible in flight," according to GE's Allen French. Total overall Dyeing cost is less than

The present position of the attacking target is illustrated by a movable target (radio line) which transmits radio energy to the radio antenna to monitor that which would otherwise be reflected from an attacking radio target. The fire control radar does not transmit, nor does it have complete resolution.

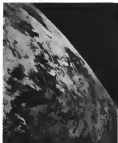
### Competing Future Position

The fire control system competitor estimates when the target goes should be aimed (dead reckoning) and ballistic corrections) so that the projectiles will hit the target at its "future position."

## There goes another one!

"Higher and faster than a 500,000-ton... really out of this world thing."

"You're right. At New I can tell you've been keeping a close eye on it."



No need for announcement, boys. In the short time since you earned your wings, rocket propulsion has been consistently conquering new frontiers of speed and space.

At RMI, recent major advances in the science of rocket power have made possible the production of new rocket engine designs far superior to the record-holding powerplants of today... superiority measured in terms of performance, reliability, economy and productivity.

Photo at left was taken at an altitude of 158 miles from an RMI powered Viking research rocket... world speed and altitude record holder for single stage rockets.

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20, where it will be when the project gets out there.

For the particular attack course being simulated, GE engineers have previously computed the target's true future position for every present position and not another set of ranges which represent the future position. Signals generated by these ranges are used to automatically position a heli-scan, target and associated tubes and displayed in the prediction and behavior room. Range angles from the target also come. Thus, at all times the heli-scan represents the latest position of a target whose present position is represented by the radar feed here.

#### Hit or Miss

If the fire control system under test has computed the correct future target position, and the target positioning unit is operating properly, when the guns are fired at the target (open switch 20 feet away), this will come back on the coordinator (see photo, p. 25). An overall fire control system error of one angular mil will cause the projectile to miss the resolution by 4 mils, with larger deviations for larger system errors.

Because of the possibility that poor response of the target sense system may produce some aiming error, despite the fact that the fire control system computer has correctly calculated the future target position, a third set of results runs is set to represent the theoretical correct answer which the computer should produce. This is compared with its output and no deviation error can be recorded.

In changing runs, GE can test one bomber or fighter fire control system configuration, including both distributed and director types for tail, nose or beam-type attacks.

#### Simulated Airbase Environment

GE has gone to great pains to simulate the full environmental scenario encountered by fire control systems. For example:

- On-ship and target motions, in any combination of roll, pitch and yaw, can be simulated by movement of the radar target and tail assembly platforms as by mounting the antenna separately on a turntable.
- Radar noise, either target-generated (interferometers included), steam, phone or internally generated, can be simulated. This is accomplished by using an Acouson ultrasonic-type or carrier to play back radar noise which has been recorded previously in flight or artificially created. GE plans to incorporate this radar noise input to the engine room.
- Ship's vibration and shock is simu-

lated by mounting the tail turret on a shaker whose vibrations and shocks are characteristics closely follow that of the airplane. Thus, when the guns are fired, this produces realistic vibration and shock.

A type recorder can be used to program and introduce control noise, jitter and power supply fluctuations.

• Windload comparable to those imposed on the gun barrels in flight are simulated during tests by means of weights and shack, each which apply the proper load on the guns proportional to their angle of deflection from the windward.

• Temperature — 100° to 160° can be produced in the Desert Room chamber where the tail turret assembly is undergoing test. All major engine temperatures are needed, or if it is desired to subject the fire control system to operation at extreme altitudes and headwinds, the tail turret assembly can be moved slowly to a large environment chamber. Here the system can be run through the same dynamic accuracy testing, except for the actual firing of the guns.

#### Westinghouse Test Station

The Westinghouse facility, because it is designed for production-line testing is somewhat less sophisticated than Desert. Also, the Air Arm Division has an outside long range designed to present a fire control system to be placed in a cold chamber and subjected to extreme temperatures while it is being fired.

In the Air Arm facility, radar energy

is transmitted from the fire control system antenna and located at the target horn. These poles are then used to shape and generate "echo" pulses which are slightly delayed and then transmitted back from the target horn to the radar antenna and receiver.

#### Echo-Less Radar Keen

To prevent radio leak energy from the radar antenna from bouncing off the walls and ceiling of the room in which the target horn is located, causing spurious echoes to be reflected back to the antenna, Westinghouse constructed a special "free-space" room. The room is completely lined with a reflecting material, developed by McMillan Industrial Corp., which absorbs radio energy, reducing reflected energy to a negligible minimum.

Further from attempt to refrigerate the large free-space room, which is located adjoining the cold temperature chamber, Westinghouse built a small intermediate room about 3-4' wide, which passes the cold chamber and the free-space room into a single working area.

The middle chamber is constructed of wood, fully insulated and exposed to air, and to the low temperature of the cold chamber. The tail turret system is installed in the middle chamber. Here it is exposed to the cold temperature, yet its radar performance is not adversely affected as it would be if installed in the steel cold chamber itself (see photo, p. 27).

A flat plastic plate, located between the radar antenna and a hole cut in the



MASTER CAN FLITER (background) programs air defense simulated antiaircraft attack, simultaneously moving a heli-scan target to exact position where target gun should be aiming



## NEW FAIRCHILD SHIPBOARD RADAR SYSTEM FOR AUTOMATIC SEARCH AND TRACKING

Fairchild radar systems have gone to sea with missile launching cruisers of the U.S. Navy.

Now operating with the fleet, the Fairchild SPQ-2 Shipboard Radar System shows how was developed to search out and track other missiles or aircraft completely automatically. And, controls have been "human-engineered" to facilitate operation under battle conditions.

Color and shape coding in this new Fairchild radar means rapid, easy identification of all controls. Rugged, shock-resistant construction protects equipment.

Here again is proof of Fairchild Guided Missiles Division's continuing leadership in design, research and production of vital electronic equipment.

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Editor is fly  
in the  
U. S. Air Force

role of the frequency room, scale off the cold temperature, set enables cold creep to pass through into the frequency room and its target lock. This plate causes less than one angular mil of radar beam divergence error, according to H. J. Lucas, head of Air Arm test facilities.

The turret gear protocols through another cut out in the airtight chamber into the frequency room, but a "baffle collar" and second the turret serves to maintain a satisfactory temperature seal.

### Rotary Target Motion

The target beam which the radar tracks is attached to an arm which is rotated at a constant pre-determined velocity. Another arm, driven from the main motor, rotates the viewing bolts one rad. For any selected rotational velocity of the target beam there is a fixed angular relationship between its position and that of the correct gun aiming position (see here last).

Occasionally errors will show up in gun aiming post deviation from a weak light on the viewing bolsters. This deviation can be recorded by means of a camera viewing a gun barrel, or by having an observer look through a specially calibrated bore-sighting telescope.

## 00000 FILTER CENTER 00000

►Predicting Reliability—Dr. R. R. Carhart, former Bell Laboratories on reliability who is now with Lockheed's Aircraft Division, Dayton, will take time with those who believe that various system reliability can be predicted on a statistical basis. In a paper scheduled for the Second National Symposium on Reliability and Quality Control in Electronics, Hotel Statler, Washington, Jan. 3-5.

►Data to Buy New Antennas—Delta Air Lines reports it will soon install new HF transmitters and antennas, selective calling (Select), automatic direction finding, and Collins Guard rails for its entire fleet of DC-7s, DC-8s and Convair-Lans.

►Atomic Mines—New address of Atomic Fuel, Inc., is 3708 "K" St., N. W., Washington 5, D. C. New buildings will house both Atomic's office and utilities activities.

►BBA Adopts Decca—British European Airways will equip its entire main line fleet with the British Decca short do-

main navigation system, following 23,000 hours of flight evaluation in BA's Viscounts and helicopters.

►Remote Control Flattop—Rutan's first 2000 sq. ft. aircraft carrier, the HHS Air-Rail, has been equipped with closed circuit TV which will enable



the crew to maneuver the flattop by remote control from defined vantage points. The closed-circuit TV also will be used to provide observation in formation and entertainment to all parts of the ship.

►SAR for South Africa—The Jan Smuts Airport, largest airfield in the Union of South Africa, will be equipped with a British Marconi S73 surveillance radar operating in the 500-610 mc band. Installation is expected to be completed by next summer.

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MAIN UNDERCARRIAGE LEG is fully operable in this portable, ground trainer for DHE Vampires. Other panels show line, tailplane, flaps and flight control details.



GOELIN ENGINE KIT includes operating, starting, service, landing, simulated maintenance, and assembly, bearing, wiring, tools and operating charts and engine blades. Engine kit comes in single package for easy shipment by air.

## 'Near Miss' Report Considered by CAB

A voluntary system for pilots to report "near-miss" incidents currently in light of under consideration by the Civil Aeronautics Board.

CAB has issued a notice of proposed rule making (Docket No. 55-54) for establishing a program to encourage pilots and other persons to make voluntary reports of near-collision incidents.

The Board said the purpose of a "near-miss" reporting program is not to enforce existing rules of the air by taking disciplinary action against the pilots concerned, but by a systematic analysis of these near-misses and the

determination of their causes to find a way of avoiding them in the future.

The information obtained, CAB noted, is also to be used in the evaluation and development of air traffic control procedures, navigation criteria and Civil Air Regulations.

The Board said that the seriousness of the near and on-collision problems constitutes the need for a reporting program. The biggest drawback, in having a successful reporting system, CAB said, is the pilot's fear of possible Civil Aviation Enforcement or other disciplinary action. This point was noted in the past year when CAB transferred the handling of "near-miss" reports from the Office of Aviation Safety to the legal department. The pilots' lack of compliance of the CAA action and its regulations have since refused to file reports.

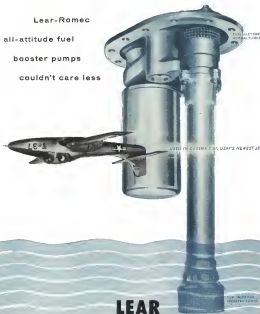
## WHICH WAY'S UP ?

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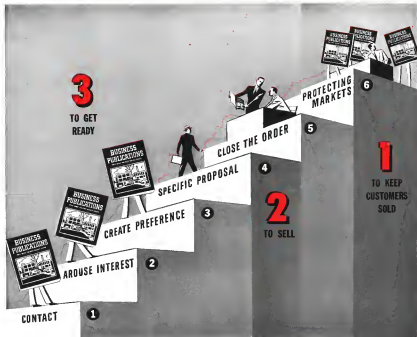
couldn't care less



LEAR

For complete details on all attitude submerged type fuel booster pumps write LEAR-ROMECC DIVISION, Abbe Road, Lynn, Ohio

# SIX STEPS to Successful Selling



Selling is an old profession with new problems. The basic steps to a sale are the same. The salesman must still contact the prospect, arouse his interest, create preference for his product . . . before making the proposal and closing the sale.

But there are new angles. Because modern industry is more complex and more decentralized, the salesman must contact more people and travel more miles per sale. Add to these facts the problem of selling in a highly competitive market, and it becomes obvious that the salesman needs help.

The best help you can give your sales force is consistent and adequate advertising in business publications. Such advertising MECHANIZES the first three steps in the manufacture of a sale. It makes contact with known and unknown buying influences at pennies per call . . . enables the salesman to use his selling talents on the important pay-off steps of the sale . . . keeps his customers sold between calls.

An interesting 20-page McGraw-Hill booklet, "Mechanizing Your Sales with Business Paper Advertising", is yours for the asking. Your McGraw-Hill salesman will be happy to give you a copy of this booklet, and also tell you about our sound slide film, "Plateau of Progress" which is available for showing at sales and management meetings.



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<sup>12</sup>The difference is "colloquial" = Scott 1999.

**WESTERN GEAR**

## WESTERN OAK

### One-Piece Castings Slash Plane Weight

Los Angeles—One-piece, thin-wall premium castings made of non-ferrous metals are being considered as substitutes for heavier, more-expensive built-up assemblies in pumps and air

One of the best examples is a complete word designator, between, rite and sufficient that K. H. Oikari, Mfg. Co. has investigated for the military, to determine the feasibility of its production in a one piece casting.

• **Wires and control systems.**

- Made bulkheads
  - Canopy and windshield frames
  - Complex air ducting
  - Atomic "planking" (new gills)
- systems of high complexity...
- Doors and latches

Chibaek has built components in these categories before, but Butler says the trend now is towards larger components of more intricate molding. The stress from advanced design requirements. The objective is to incorporate in an integral part of the casting as many features as Chibaek's subsidiaries are capable.

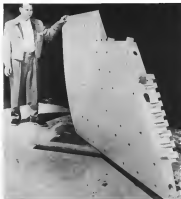
As an example, the wing panel design which Olszewski studied would be a two-piece tape wing with a leading edge 129 in. at the root and 54 in. at the tip. The company now is preparing a proposal for the casting job.

Weight saving obtained through use of this wall curbing may run as high as 10% in particular applications, according to Brier.

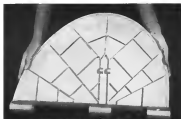
This spring is a result of offset cutting design and imposed mechanical properties inherent in this wall construction.

Bailey reports that static tests of this wall ceiling show an extreme minimum strength factor of about 160% of design load. The gross minimum strength factor is more in the neighborhood of 190%. In other instances, static strength has run well over double the design load factor, and trigon testing has shown that parts generally last at least twice the design life (concrete).

These test results indicate that de-



**CASE ALIGNMENT** color was good for Chase Vacht Brothers I noted



REJECTION-LATE occurs about two days after (0.5 to 1.00 m) and after

# "For Want of a Nail..."



*For want of a nail the shoe is lost,  
for want of a shoe the horse is lost,  
for want of a horse the rider is lost.*

George Herbert's statement applies to electronics today as it did to riders three centuries ago. The point may be illustrated by considering a vital electronic unit made up of thousands of components. If the least of these components fails, the whole unit may fail—and with it a strategic military mission.

The problem of reliability is becoming increasingly important as the science of electronics advances. "Black boxes" are hard pressed to perform more complicated tasks with increasing efficiency. And at the same time, the requirements call for smaller dimensions. Notwithstanding environmental extremes of an order hitherto unknown, every

resistor, capacitor and relay must perform reliably. Each "nail" is critical.

That is why RCA is continuing its vigorous search for ways and means to increase the reliability of every component in an electronic unit. This program never ceases. It follows through from design to field evaluation. Everything learned is immediately applied to current development and production.

In seeking a degree of electronic perfection never before attained, RCA joins hands with others in the field. This matter of reliability is an industry challenge to be met by ingenuity, brain power and engineering knowledge whenever it is found.

DEFENSE ELECTRONIC PRODUCTS  
**RADIO CORPORATION OF AMERICA**  
GARDEN, N.J.



**FIGHTER SPEED BRAKE** seen but for its over sheet metal conductor



**RID** of dip-solder assembly is 11 ft. higher than a built-up unit



**OTHER PARTS CAST** by Obolok include landing gear wheel well door (left), an water door (center) and gun blast tube (right)

system can bring about even greater weight savings in castings by designing for higher strength alloys and/or incorporating flange sections. Of equal importance is the factor of continuity, fused as integral cast structure, which allows uniform cross-sectional areas of internal bracing.

One of the aces of this well-casting job at Obolok, for which tooling was being made, is a bulk or door for an advanced missile design. This rectangular sheet measures approximately 4 ft. long, 14 ft. deep, 3/4 in. thick. "It is probably one of the most complex castings we have yet attempted," Butler said.

The door is a combination of cast and three adjacent boundaries. Inner bend passages evolved from a single contoured rectangular opening. Butler claims that, compared to the built-up counterpart, an identical sheet, a weight saving of 10-15% can be achieved.

Then also could be a considerable saving in production time.

Other examples of processes created Obolok is producing for his product.

• **Obolok wing panel** for Hughes 1 model. Landing gear measures 60 in. wide between leading and

trailing edges in 78 in. Area is approximately 25 sq. ft.

The maximum skin thickness should be .200 in., tapering to .130 in. outboard. Between the skin are integrally cast main beams and stiffening ribs. The thickness of these members is comparable to that of the skin. A wingload hinge also is integral with the casing.

Finished surface has an exact finish equivalent to a 125 rms. machined finish.

The casing is made from AZ-95A-T2 magnesium. It weighs 1675 lb., saving 652 lb. from the corresponding built-up assembly. Approximately 400 assembly hours are saved. Paper work is saved about 750 pages and 40 hours of drawing time to about 10 pages and 20 minutes working time. Some 2,000 fasteners are eliminated.

• **Prototype turbine wing panel.** This specimen is identical to the one shown and built-up-and-is intended to replace a heavier stainless steel unit. Thickness averages about 1.25 in. in

periphery, skin step is not to cut to fit the contour of the plate, so that no machining is required before installation.

Tests have shown that the aluminum casting withstands firing, shock, and heat exposure. Originally cast for McDonnell Aircraft, the gun blast tube is being adopted by other companies, according to Butler.

• **Autoclave dip-solder reel.** Designed for use with automatic soldering machines, this suspension assembly consists of a frame, reel and end bearing. Overall size is about 24 in. high, 20 in. wide and 20 in. deep.

The cast reel and frame assembly is a completely redesigned of the existing fabricated unit, and saves 13 lb. in weight. All rolls and ribs are 100 in. except for the base which is 150 in.

Passages for electrical conductors are cast integral with the frame.

• **Landing gear wheel well door.** This prototype cast magnesium article was made for an interceptor. A double wall configuration, the gear measures about 48 by 40 in. and measures a skin and rib thickness of about 100 in. on the outer 10 in. of the periphery.

The door was cast in a pre-welded

condition to go in "oil cooking" effect for light coating.

• **Arrows done.** A cone circular configuration, the prototype supersonic arrow is about 14 ft in diameter. Six and nine are held to between 0.9 and 0.95 in—a thickness value not accommodated for production runs.

• **Air intake duct.** This is a D-shaped prototype and not from 28:1 A, a resonance suppression allow. Stiffening ribs are spaced along the duct exterior, with lightning bolts in the ribs. Thickness of the ribs and duct walls is 100 in. Size of the duct is about 22 in long, 35 in wide and 24 in high.

Another duct now under study for a superjet engine, manufacturer to determine feasibility for existing is a sample station, about 4 ft in length, with a rectangularly shaped opening measuring 10 in by 26 in. Rib of varying height (2 in to 5 in) on the outside surface are spaced at 5-in intervals. Rib ends are flanged in two dimensions.

Compared to the duct itself, fabricated component is a structure that is at least 75% of production mass will be used.

• **Spine brake.** Designed for a carrier-borne fighter, five part structure about 30 by 40 in, 1/2 in thick, and is 120 in throughout. Five of these brakes are required per plane. Each costing is \$5 to higher than its steel metal counterpart, so 20 lb in weight per plane. Excess to use Doherty's machine sand casting process for this will save time, have saved to Sonotek Casting Co., Wichita, and Sonotek Foundries Inc., Salton, Calif.



**Automatic Tester Finds Aluminum Flaws**

The ultrasonic-type electronic tester checks for and can reject aluminum alloy slabs up to 48 in long, 14 in wide and 24 in thick. It is reported to be the first fully automatic tester of its type. Capable of detecting a defect as small as 1/8 in in diameter, and with a scanning speed ranging from 4 in to 10 in per sec, it works in a variety of positions and the entire surface of the aluminum slabs. If a flaw is detected, the operator is alerted by two alarms—a bell and a red light—and the defect is automatically marked. The operator then shifts to manual controls and can determine the size and shape of the flaw in terms of ultrasonic standard blocks. The tester was built for Kaiser Aluminum and Chemical Corp.'s Vancouver, Wash., rolling mill by Elcom-Centrics Inc., Pasadena.

## PRODUCTION BRIEFING



• **Pacific Division, Bendix Aviation Corp.** has now completed in addition to its North Hollywood engineering building, increasing area from 21,000 sq ft to over 100,000 sq ft. Facility will continue all engineering activities now at three separate locations in the San Fernando Valley.

• **More than 40 different patterns of Regalite metal, made by a computer milling process that increases strength of monolithic and aids heat dissipation, are available in sheets and are formed into strips or coils from Regaloid Metals Corp., 730 Glen St., Buffalo, N. Y. A stress application of the process has been intensive fabrication of the engine door on the P400 A-17 for General's E-103A delta-wing fighter (AUG-Oct 17, p. 30). Regalite titanium sheets are used to increase stiffness as much as 145%, permitting a weight saving of 27%, the maker says.**

• **Ryan Aeronautical Co., San Diego,** has started 45,000 sq ft in addition to its engine parts building, research for design of engine tools, including other recent expansion, the will bring Ryan's total floor space to 550,000 sq ft. Payroll has increased to about 4,700, a 1,600 man increase in the past year.

• **Avco or Industrial Sound Control, Inc., Hartford, Conn.,** have been acquired by Koppert Co., Inc., Pittsburgh, Pa.

• **New aircraft seating manufacturer is Flight Line Corp.,** with offices and plant at 8330 San Bernardino Rd., San Valley, Calif. President is Wallace L. Jones, vice president are John A. Pahl and John W. McKee.

• **New and larger facilities will be built for the Kansas City District office by General Controls Co., Glendale, Calif. Address 2014 Oak St., Kansas City, Mo.**

• **Fractured helicopter engine facilities have been obtained by Hydrex Inc., Inc., Berkeley, Calif. Aircraft fuel pump module, in cooperation with its subsidiary Electro-Aux, Inc., N. Hollywood. Hydrex Inc. will continue to make motion for other companies.**

• **Large quarters have been taken by Herkington, Inc.'s West Coast Division at 179 Hines Ave., El Segundo, Calif. Inc. makes aircraft autopilot controllers, radars, light, vision and color.**

• **Canadian sales agent for Avco's Division of Lockheed Products, New York, is Norcross, Vancouver, Canada, Ltd., St. Laurent, Quebec. Lockheed products electron systems and airborne navigation.**

• **Doubled production facilities is the one of new 17,000-sq-ft plant being erected by Longquist Engineering Co., Los Angeles, Calif., aircraft parts firm and machine tool maker.**

• **Avco Logistics Corp. is new corporate sales of winged Harpoon Manufacturing Corp., Pasadena, Calif., and its wholly owned subsidiary Air Logistics Corp. Harpoon has been converted**



**Terrier Test**

Carrier-based Terrier anti-aircraft missile tests from the deck of USS Monaghan during evaluation trials at sea. Note that wings of second missile in battery have been deflected to full position in part of parking test. (Wings of second missile in foreground are in down position.) Ejecting launchers in the USS Kansas (DD-184).

with aircraft and truck support equipment, its former subsidiary will install systems for the equipment, in addition to engine services, division Air Logistics will build a new plant on a 100-acre site in La Verne, Calif.

• **New laboratory facilities have been opened in Dayton, Ohio, by Inland Testing Laboratories, Chicago III, to handle qualification and customer tests for USAF and its contractors.**

• **New plant and office facilities will be built in Los Angeles, Calif., by Pacific Scientific Co. The Aero Division with an instrument laboratory will be located in a 17,500-sq-ft structure.**

• **Shock & Vibration Research, Inc., 520 Hammond Building, Detroit 26, Mich., is a new firm, which will pro-**

vide studies for manufacturers in meeting equipment for position equipment such as order and provide guidance, division President is Robert L. McKee, formerly with Bell and Branson Aircraft and with the U. S. Army as a civilian scientist.

• **To mark its expansion in the aviation equipment field, Seefield Engineering Co., Pittsburgh, Pa., has changed its name to Clowson Engineering Inc. Firm makes ground serving equipment.**

• **Schuler Bros., Inc., have opened two new sales and service offices 212 Hersh Bldg., Alhambra 3, Cal., and 709 Bldg. of America Bldg., San Diego 1, Calif.**

• **New plant and offices at Clowson near Ottawa, Ontario, have been opened**

by Bogue Electric of Canada to support service to the Royal Canadian Air Force. New structure covers about 85,000 sq ft, and will employ approximately 150.

• **Expansion of over \$2 million in aircraft manufacturing facilities is being undertaken by Avco Manufacturing Co. division of E. I. du Pont, Inc., at Monticello, Calif. New plant will occupy 170,000 sq ft.**

• **New 2,200-sq-ft vacuum stuffing burner, said to be the nation's largest, has been put into operation by the Van Horn Michels Corp., Roseton, N. Y. Former, built by Equipment Division of National Research Corp., a great sector of the firm, will have not be more 40 and 75 tons of purified methanol monthly.**





## SEWING STEEL TOGETHER with 4-million-volt stitches

Pieces of steel as large as railroad-car axles are being welded with speed and efficiency in the Cleveland Pneumatic plant.

The world's largest and most powerful general-purpose flash-butt electric-resistance welding machine is joining aircraft components now. This machine can butt-weld high-alloy steel pieces having a total cross-sectional area of as much as 67 inches. With low-carbon material, this area can be as large as 100 square inches.

A limited amount of this machine's extra time is now available on a contract basis to produce highest quality large-area welds on high-alloy steel at low unit costs.

Write for Booklet C-1855 which describes this machine and its capacities, and also tells you how our Contract Welding Department can be integrated with your production.

## Cleveland Pneumatic Tool Company

370 East 17th Street • Cleveland 5, Ohio  
MAIL-ORDER DEPARTMENT • ALL GOV. CONTRACTS  
AIRCRAFT DESIGN BAKING EQUIPMENT



## AT CLEVELAND PNEUMATIC THESE FACILITIES CAN ALSO WORK FOR YOU



### MACHINING

Your welding assemblies can also be given almost any machining or finishing that you require when they are contract-welded at Cleveland Pneumatic. Our machine shops include all types of turning lathes and machines, from pieces that can turn columns 25 inches in diameter and 17 feet long to micro-piece thread grinders capable of grinding any thread—quickly by diameter as fine as .001 inch.



### HEAT-TREATING

A large and experienced heat-treating department can give your contract-welded parts the type of heat treatment that is required. Great heat-treating furnaces and quench tanks 18 feet deep can handle alloy-steel parts up to 15 feet in length.

Cleveland Pneumatic Tool Co.  
370 East 17th Street • Cleveland 5, Ohio



AUSTER AIRCRAFT will make bid for New Zealand's agricultural market with its Agricola

## Auster Agricola Starts Flight Test

A bid for the New Zealand agricultural market is being made by Auster Aircraft, Ltd., Bournemouth, England, which has started flight tests of a new low-wing plane, the Agricola (Latin for harvest).

Its particular specialty is applying aerial photography and similar work from the air to the orchard, the quarry and growth of grasslands, a vital factor in cattle-grazing countries. New Zealand, which has done considerable pioneering work in aerial topography, contracts first widespread use of this technique could increase its meat production by 10% to 15%.

The new Agricola is designed for slow speed, low altitude work and in the field maintenance using simple tools. The 740-hp Continental engine has jet exhaust, making the ground handling use of full power without engine over-heating. High-lift wing design is aimed at getting the Agricola airborne in 120 yards with full load.

For ease of repair, construction is of steel tubing, fabric covered. Cockpit is placed high to provide maximum visibility, with the phosphate hopper placed beneath it to afford some protection in event of a crash. Instrument panel has four rubber padding in oil drum pilot protection.

The hopper is loaded behind the cockpit to assure that no load is blown into this area while the plane's engine is running. In an emergency, the pilot can dump his entire three-quarter ton of chemicals in five seconds, Auster reports. During test operations, an additional two passengers can be seated in the fuselage, behind the hopper.

Interchangeability of parts is a key feature. Each landing gear leg and wheel can be fitted to either side, whereas the elevator can also be interchanged.

To combat chemical corrosion, the entire area of the fuselage, behind the passenger compartment is sealed off and plastic panels and doors are used for finishing. Control cables and fuel line the fuselage for easy inspection and thus, are in full control to meet chemical action.

Important dimensions for the Agricola: Span, 42 ft., length, 27.5 ft., tailboom height, 8.5 ft., wing area,

1947 sq. ft., landing gear track, 14.5 ft., main wheel diameter, 22 in., tail wheel diameter, 10 in. The five-blade metal propeller has 7.5-ft. diameter.

## PRIVATE LINES

Lockheed has no business aircraft projects on the drawing boards now, does the company have any plans to enter this market, according to H.J. Hubard, vice president engineering.

Over 100 executive model controls have been shipped by Globe Industries, Inc., Irvine, Calif. The company has a three-month backlog of orders for its ground-based units, which manager Robert Conner, has told Aviation Week. Installations are split fairly evenly between Piper and Cessna planes, he says. The ground-based instruments call course, altitude, turn and yaw with varying controlled stable turns using a bank control.

Sales of over \$1.2 million in corporate aircraft have been made this year by On Mark Engineering Co., Bedford, Calif. Units comprised three DC-3s and four Cessnas, Douglas B-26s. Firm has main plant at Lockheed Air Terminal, has leased facilities recently at

## HAWKINSON TREADS FOR AIRCRAFT TIRES

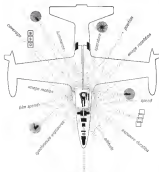
Serving Many of the Airlines in the United States,  
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PRECISION Treading By the Exclusive Hawkenson Method

Authorized **HAWKINSON TREAD** Service  
in Montreal, Ohio, W. B. A. Canada or, Port of Spain, Guyana  
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**J**et age photo reconnaissance is a seemingly impossible one man job.



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In this day of supercomputer speeds, getting a phone in a half time job. All the drama of fiction inherent in precision photography and you have an almost impossible situation! But Chicago Area's Industrial Photographic Control System change impossibility to simplicity... automatically obtaining, coordinating, synchronizing and measuring results of these constantly changing factors to take fully into account. This is the reason why America's newest news item job only on C.A.I. control system... only one facet of Chicago Area's advanced research and production in the fields of optics, mechanics and electronics.

The interesting, colorful C.A.I. brochure, "Advancing Horizons," will be sent to you upon request. Learn more about our advanced research and manufacture of aerial equipment—write for your copy today!

**CHICAGO AERIAL INDUSTRIES**

1980 Hawthorne Avenue, Melrose Park, Illinois  
 Change of address: 518 E. Madison Avenue, Chicago 1, Illinois

Grand Central Aircraft Co., Glendale, is handling anticipated greater commercial business volume.

U. S. civil plane exports of aircraft weighing 6,000 lb. and under totalled 53 units valued at \$69,416 during October, bringing to 741 the number of planes in this class exported so far this year. Total value was \$6,534,895. Total exports in 1974 were 496 units valued at \$3,123,671.

**First French-built Widgeon** over-cited to Super Widgeon competition by Milwaukee's Hickory Co., P.O. Box 100, is being delivered to Reading, Pa. (Antares 500cc, 100-hp, 100-cu-in. Super) for the French SCAN-18. The global bank under license from Cymac has been imported into the U.S. by Welch Appliance Co., N.Y., which has options on some of the planes. The five-cyl SCAN-3000 conversion costs \$16,000, without engine, a new engine model is \$2,000 additional. There are two 40 Super Widgeons in operation in the U.S. and Canada. Welch reports that on last weekend's test, it sold \$518,000 worth of Widgeon conversions.

Weather radar for Twin-Bomb and larger business planes is being developed by Weather Inc., Bridgton, Me. Target is a unit weighing about 60 lb., with price "substantially" lower than current models.

New Carrier 450 distributor is South on Flight Service, Inc., Charlotte N. C., which will sell the two-engine Navion trimotor in North and South Carolina.

**Timing development for living co-owners**, built around a 1,200-ft. strip, will be underlines next spring east of Spokane, Wash. Loren Larsen, operator of the strip, says that plan calls for creation of 300 homes at the \$12,800-\$16,000 price range, with a limited cost of the development being \$5.5 million. Construction of street and water has begun.

New DME server center, Qualiton, Inc., at Lockheed Air Terminal, Burbank, Calif., has been opened by National Aeronautics Corp., Anaheim, Pa. Appointment brings to 79 the number of Narco designated distress-avoidance equipment service facilities in the U.S. More than 500 Narco DMEs are now installed, mostly at business airports.

Customs Ball 47884 copier has been purchased by Roger Sherman Turner Co., E. Hartford, Conn., hauling and rigging specialists, to expedite the firm's material requests.



## New G-E Turbostarters give fast starts without ground power assistance

Sixty-pound unit produces more than enough horsepower to bring the engine of a USAF medium bomber to full speed within 25 seconds—anywhere.

0.5" cartridge turbocharger makes the Martin B-57 one of the first USAF jets to enter production to be equipped with self-contained starting power. With the lightweight system, the planes can operate from the most advanced bases, even where ground support may not be readily available. At any base, maintenance group take-offs are now possible without waiting for ground power—if leaving the planes to be dispersed for maximum protection against air attack.

#### Speed and Reliability

According to E. G. Uhl, Martin's Vice

President of Engineering "The Martin Company has used General Electric cam-trip starters since they were available. Thousands of starters have been supplied successfully under all types of environmental conditions. This starter gives our Air Force the most rapid engine start available and has proved itself to be the answer of handling expensive complex starting equipment."

### Applicable to Any Aircraft

son's Jet Ski® starting power, either military or commercial. In addition, the models now available, a 40-hp fuel-injected outboard that is only 12½ inches long and will produce 30 ft-lb of torque for each pound of weight it is in the water. This drive can be easily modified for your specific engine requirements and energy source.

For further information on O-E turbochargers and other accessory drives, manufactured at the Aircraft Accessory Turbine Dept., West Lynn 3, Mass., contact your local O-E Representative Sales Office.

*Progress Is Our Most Important Product*

**GENERAL  ELECTRIC**

Only two adverse reactions, dizziness and nausea, are reported to occur in the clinic.



Integral spin: spin-drift mechanism makes sense  
for a fast ion-ion jet.





**THERMOCOUPLES** and harnesses have self-assembly construction to ensure ruggedness, low maintenance.



**SYSTEM** is out of many types of G-E servo-temperature systems available. Indicators used with G-E systems have expanded scales to show fast, accurate reading.



## G.E. Offers Complete Systems Responsibility with a "Team" for Temperature Measurement

**HIGH-ACCURACY THERMOCOUPLES AND SERVO-TEMPERATURE INDICATION SYSTEMS OFFER "SINGLE-SOURCE" ADVANTAGES FOR JET ENGINE APPLICATIONS**

**G-E THERMOCOUPLES**, using stainless-steel harnesses and self-assembly construction, assure long-lived reliability as jet exhaust gas temperature measurement. Completely winged magnetic thermocouple harness-and-lead assemblies can operate efficiently under extreme temperature and vibration conditions found in aircraft gas turbine applications. Left of typical G-E exhaust gas temperature systems is 750 hours.

**UNIT-ASSEMBLY CONSTRUCTION** allows self-reporting harnesses to be installed easily. You simply tighten locknuts to bases. Because separate connectors are discarded, less maintenance is required. These outstanding features in low-cost

G-E thermocouples can provide accurate, reliable temperature measurement for your jet engine applications.

**SEE FOR YOURSELF** how General Electric exhaust gas thermocouples will provide improved temperature measurement for your jet engine by ordering prototypes. G-E is prepared to design and provide prototypes of any exhaust gas thermocouple—without charge.

**G-E SERVO-TEMPERATURE INDICATION SYSTEMS** allow the use of easy-to-read repeater indicators. Expanded scale type indicators have only one pointer instead of the usual two for more accurate reading. G-E repeater indicators are especially adaptable to the requirements of X-model

aircraft where simultaneous readings on both pilot's panel and push panel are desired. Systems can provide a signal for control indication proportional to temperature, time over temperature indication, or far dual indicators. Many accurate thermocouple-and-indicator systems, G-E servo-temperature indication systems offer a high-accuracy way to temperature indication.

**FOR FURTHER INFORMATION** on the G-E thermocouple and servo-temperature indication system "team-work" and how they can meet your temperature measurement problems, contact your nearest G-E Representative Sales Office or write Section 546-2, General Electric Company, Schenectady 5, N. Y.



**UNIT-ASSEMBLY** thermocouples and harnesses such as shown in 2000 in 25 minutes. After longer operating life. Winged magnetic thermocouple and stainless-steel harness withstand high temperatures.



**EASY TO INSTALL**, G-E exhaust gas thermocouples are self-reporting and require only color-coded, low maintenance three wire cable systems. To install such thermocouples, you tighten a single locknut.



**MORE THAN 8,000,000 HOURS** flying time has been logged by Air Force Boeing B-47 using G-E jet engine exhaust gas thermocouples. Over ten years' experience in production assures G-E exhaust gas thermocouple accuracy, dependability, and long life.



**IN ALL TYPES** of aircraft, including fighters like the U.S. Marine Corps' North American F-4D, G-E thermocouples meet the demands of reliable performance in high ambient temperatures. Elements and leads are welded and subjected to hundreds of tests that give proof.

**G.E. Offers  
a Complete Line  
of Instrumentation  
for Both Commercial  
and Military Aviation**

### **ELECTRICAL QUANTITIES**

Voltmeters and Ammeters  
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### **UNITS SPEED**

Tachometer Generators  
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Transmitters  
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Transmitters  
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Directional Compass Systems  
Basic Compass Transmitters  
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Transmitters  
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Servo-Indicator Systems  
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### **COMPONENTS**

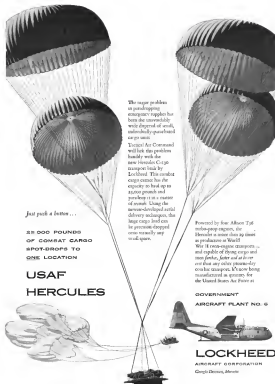
Resistor Elements  
Speed Elements  
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### **TRANSFORMERS FOR AIRCRAFT**

For further information on any of the complete line of General Electric aircraft instruments, contact your nearest G-E Representative Sales Office or write Section 546-2, General Electric Company, Schenectady 5, N. Y.

**GENERAL ELECTRIC**

**GENERAL ELECTRIC**



The major problem in paratrooping emergency supplies has been the unreliability of wind, which usually causes loads to go awry.

Tactical Air Command will look into this problem headily with the new Hercules C-130 transport built by Lockheed. This combat cargo carrier has the capacity to load up to 32,000 pounds and parachute it in a matter of seconds. Using the new-developed aerial delivery technique, the large cargo load can be precision-dropped onto virtually any soft spot.

Just push a button...

32,000 POUNDS  
OF COMBAT CARGO  
SPOT-DROPS TO  
ONE LOCATION

USAF  
HERCULES

Powered by four Allison T56 turbo-prop engines, the Hercules is more than its weight in production as World War II twin-engine transports... and capable of being cargo and more flexible, faster and to deliver over than any other transport can handle. It's now being manufactured in quantity for the United States Air Force and

GOVERNMENT  
AIRCRAFT PLANT NO. 6

LOCKHEED

AIRCRAFT CORPORATION  
Greenville, S.C.

## SAFETY

Israeli Report on Tragedy Over Bulgaria

# El Al Plane Shot Down Without Warning

A Conquest aircraft (Type 146), registered number 4X-AOC owned and operated by El Al Israel Airlines Ltd. flying on a scheduled passenger flight (Flight Number 4017/70) from London to Tel-Aviv via Paris and Vienna, was shot down by Bulgarian fighters at about 0540 GMT on 27 July 1971.

The aircraft broke up at an altitude of approximately 2,000 feet at a point 15 kilometers northeast of the vicinity of the river Struma and Struma in Bulgarian territory near the Bulgarian Greek border.

The aircraft had about 15 passengers and 3 crew members. There were no survivors. At 0531 on 27 July, Athens Air Traffic Control received the following SOS on a ground-to-air frequency of 3450 kHz: "SOS 4X-AOC." The message was relayed immediately by Athens ATC to Lodi ATC. Athens Flight Information Center declared an emergency and search and rescue services were alerted.

However, before search and rescue action could be taken, Athens ATC was informed that the aircraft had been observed falling to flames near the Greek-Bulgarian border near the Bulgarian village of Terfeneva and passed the information to Lodi ATC.

At 1230 on 27 July the Ministry of Communications requested this Commission of Inquiry to inspect into the disaster.

### Weather Conditions

The following report of forecast and actual weather conditions will be divided into three sections:

1. Weather on the Athens 10 Airways between Bulgaria-Kyprinos-Skopje and Greece-Sofia.
2. Wind direction and velocity over the crash site.
3. Weather over the South Bulgarian territory.

Source of information:

- (a) International synoptic charts and area report as transmitted by Bulgaria.
- (b) Synoptic chart for area's actual weather at 0600 on 27 July 1971, as starting information on "hot line" of connection and "hot weather".
- (c) FRO data (1800 feet) actual wind chart as contained by London, Los Angeles and Tokyo Area's radioteletype.
- (d) IAF West European Division's report on a flight on the 27th of 1971 km over the crash route.

1. Weather on Athens 10 between Bulgaria and Kyprinos

Between clouds (average 1/10), 1/8 of Struma-Carpathians, 1/8 of Grouha, cloud base approx 2000 feet, cloudtops about 5000 feet, temperature at 500 pils level (3600 feet) -11°C, velocity 10 km, but heavy dew after sunrise hour.

Kyprinos-Skopje

Decreasing cloud amounts (54/10), 5/8 of Carpathians and Struma-Carpathians, base at 1000 feet, 1/8 of Alto Carpathians base

\*All these in this report are GMT.



MAP drawn by Israeli investigating commission. Dotted line No. 1 shows Bulgaria's version of the aircraft's flight path. Line No. 2 is commission's flight-path line.

9000 feet but considerable freshly melted build up of Caucasus and Caucasus-her melting to 20,000 feet with clouds, showers, lightning, snow and some rain.

Speed of these developed Cu and CA's was not noticeably high about 50 MILES WIDE and extending at least 100 MILES wide side of Athens-Athens 10. These clouds were in some reported as "hot weather" (not those lines) and as "hot line" and "hot weather" at 6000 feet. The observed synoptic actual weather in South Yugoslavia and Northern Greece for 27th at 0500 hrs said: "Due to cloudy, local current with drizzly showers mainly in north."

South Bulgaria and Northern Greece

Weather cloudy to fair, rapid improvement of local cloudy conditions. 1/8 of Carpathians at 4500 feet, 1/8 of Alto Carpathians at 9000 feet. Visibility 10-25 km. Temperature at 3600 feet minus 11°C.

2. Signal Wind Direction and Velocity on Athens 10 Airways between Bulgaria and Yugoslavia-Kyprinos

The direction of the upper wind

(18000 feet) was constant from 360° throughout the 300 MILES stretch at Bulgaria and up to a point about 50 miles south, the velocity was at least about 1835 knots. From there on, the wind increased sharply to a velocity of 19 knots, due to the development of a large "LOW" pressure area in the North and a "HIGH" pressure area in the South at 5000 feet level, after that decreasing from the Thracian-Greek line to the northwards.

International Synoptic Report for Upper Winds

South Bulgaria and Northern Greece

27th 0400 hrs

Of the weather is discussed above two factors are most relevant to this flight. Firstly the presence of Comberbion



# First in RAMJETS



**marquardt** AIRCRAFT CO.  
Van Nuys, California

THE WORLD'S LARGEST AIR ENGINE RESEARCH AND DEVELOPMENT CENTER

## SAFETY

Seats are now installed at the airplane's position.

(c) With that and their effectiveness. It is assumed that when within range of the RD engine and the VOR, a hot probe, that will be used. The VOR was, no doubt, helped in keeping the air in the air, for the first part of its flight from Delgado towards Shogin. The stage of the VOR, should not be considered reliable beyond 70-80 second mile.

The stage of the RD engine, could not have been considered reliable in its early course in its operation. This applies and may be a greater extent in the Shogin engine which was surrounded by state.

The Shogin engine, in its early out put and the possibility of a second stage, would not have been reliable. It should be noted that the effectiveness of all these undisciplined engines may have been reduced by various conditions.

## GROUND TO AIR COMMUNICATIONS

- Time Message
- 0104 YUD from 45-46C—An Y-100 Central Delgado—RD-40C 1 in parallel from Y-100 at 1215 on closed to and estimate result at 101 in 0100 on ascending 1780 for estimate. Flight Information Center Y-100 at 0105.
- 0106 45-46C from YUD Right, on a horizontal, except YUD from 45-46C will 1 in being vertical with.
- 0107 I have nothing for you.
- 0108 45-46C from YUD Right, a horizontal, and.
- 0109 YUD from 45-46C Right, (check).
- 0110 BE from 45-46C at 1780 for estimate result.
- 0111 45-46C from YUD Right, on a horizontal, except YUD from 45-46C will 1 in being vertical with.
- 0112 RE Right, in parallel.
- 0113 BE from 45-46C at 1780 for estimate result.
- 0114 BE from 45-46C at 1780 for estimate result.
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- 0156 BE from 45-46C at 1780 for estimate result.
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- 0197 BE from 45-46C at 1780 for estimate result.
- 0198 BE from 45-46C at 1780 for estimate result.
- 0199 BE from 45-46C at 1780 for estimate result.
- 0200 BE from 45-46C at 1780 for estimate result.

## FLIGHT RECONSTRUCTION

(a) London to Delgado.  
The flight started from London at 2015 hours on 25 July. A landing was made at Paris and then at Vienna. The aircraft left Vienna at 2110 hours on 27 July. According to the flight plan filed at Vienna an estimated time of arrival was Delgado was 1 hr 41 min after

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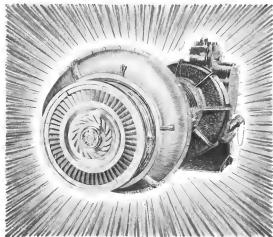
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### SAFETY

side off, that is to say at 0435. In fact, as reported over Budapest at 0423, 1 hour 15 min. later, when the report reported over Budapest, it was, in fact, not the reported position. This was confirmed by the Control Office at Budapest, who stated that he had heard the aircraft overhead at the time of the report. The radio facilities at Budapest revealed earlier and the extreme speed used in the report would cause the aircraft could not be off course at the time.

(5) Budapest to Point 0430 (Venezia) 0430/0430.

From Budapest the aircraft heading would be along the Arctic Arctic 15 that is to say in a magnetic course of 165°. The wind forecast for this part of the route and used in the flight plan were 279/22 knots at an altitude of 16000 feet. The altitude for which the aircraft was cleared was 17000 feet.

The wind to forecast was a maximum of 4° in the right group heading of 165°. This was the heading and in the flight plan.

The time for the flight Budapest-Skagway was 0430. The aircraft was 0430. The planned arrival over Skagway was, therefore, 0517. The actual report was over Skagway at 0511. This is to say 17 minutes ahead of the report over Budapest and the report over Skagway. This was the last 17 min of the flight was, in fact, in fact.

### Wind forecasts

Plotting the aircraft position after completion of the first leg (75 nautical miles) of the leg on the basis of its indicated air speed of 200 statute miles per hour at an altitude of 17000 feet with an outside temperature at -10°C, which gives a true air speed of 210 knots, we were at the point marked 0431 on the attached map (page 12).

From this point on, the wind actually encountered were 240/20 knots. The wind forecast at 165° was, therefore, 279/22 knots. The point could not have been used at the time of the report and would not, therefore, have used any correction to the error. The aircraft was, therefore, late compared to the time, being at below 165° until arriving over Skagway. This report was made at 0511. At this time the aircraft would, in fact, have been at the point marked 0431 on the attached map.

The passenger report over Skagway has not probably due to an error in the direction of the radio signals employed by the transmitters which were well developed over the actual flight path (see underlined map attached). It should also be noted that the aircraft, based on the flight plan, could not have been cleared by an in-ground observation owing to the fact that the aircraft was passing over clouds.

In the bottom of this report dealing with the matter it is noted that from Budapest to north of Skagway there were considerable build ups and isolated clouds. However, reaching great heights, with building, some real severe turbulence. Considering these conditions, the

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## SIGHTS

Eighteen attacked the aircraft twice when it had lost considerable height and was evidently seeking for a place to land. A last attack was observed on it at a time when the course of the aircraft was northwest heading for area Bulgaria territory, the aircraft had already been hit and was obviously making an approach for a forced landing either in the Western valley or as an abandoned aircraft further south.

Finally, no radio warnings on the frequency used by the International Civil Aviation Organization for aircraft transmitters in this region were observed by either Clark or Yugoslav aerial intercept troops keeping watch.

### Dispute Bulgaria's Finding

The Communists therefore also can be considered to have accepted the findings on this point as not at the official Bulgarian Government.

#### (b) Eye Witnesses on the Border

The Yugoslav witnesses, it will be remembered, made their observations from posts along the Yugoslav-Bulgarian border.

One of the three witnesses stationed at the most northerly "A" on the map was a large aircraft flying at a north-easterly direction over Bulgaria and two fighters approaching it from the east. One of the fighters took up a position between the large aircraft and the Yugoslav-Bulgarian border. The other fighter maneuvered around the large aircraft. All three witnesses, at the point "A," heard bursts of machine gun fire but none of them saw any of a jet.

The two witnesses stationed at the point marked "B" on the map heard no aircraft in the northeast of their position and heard bursts of machine gun fire. Then, their direction of aircraft moving in a north-easterly direction to reach the Greek border. After this they heard more machine gun fire. The aircraft was flying in a southeasterly direction and was about 7 kilometers distant from the observation post when it disappeared from view.

A witness stationed at the point marked "C" on the map also saw the aircraft to the northeast of his position and observed it flying to the south and east on a southeasterly line. He heard machine gun fire but did not observe fighters or smoke from the plane which disappeared over the mountains northeast on the map north-northeast at 11°28'N 21°55'E.

### The Kill

The next mission to see the aircraft was the Greek observers along the Greek-Bulgarian border. The first group of six men (three witnesses) stationed at the point marked "D" on the map saw the aircraft approach over the mountains (11°28'N 21°55'E) from the southwest. When it appeared, smoke was coming from its right side.

Before the aircraft came into view an engine burst a hole in the back to be heard on fire and another pilot be thought was the aircraft. The aircraft was seen flying south on a long flight but under no fire.

Smoke of P-51s the aircraft started to turn around the southwest heading for the point north of hills 218 and 281. A pilot bailed out of the aircraft at a point abandoned military aircraft. All three witnesses at this point state that when the aircraft was over hills 218 and 281, it broke up and fell in pieces. Part of the debris fell on the north-south ridge on the hills and landed for a short time. The other part fell on the north-south ridge and continued burning for more than an hour.

When the aircraft broke up it made 4 or 5 or 6 seconds of approximately 2000 feet.

Other witnesses stationed at points further east along the border heard machine gun fire before the aircraft appeared and then saw it moving low over the mountains with fire and smoke at the end of the right wing.

They generally confirmed the previous witnesses regarding the path the aircraft took. However, the two witnesses, two at the point designated as point "D" on the map, disagreed completely after the aircraft turned south but the other two agreed it right up to the time when it broke up. When this it crashed and fell to the north. These witnesses heard a loud explosion at the time the aircraft broke up.

These other witnesses, situated north of the mountains, saw the aircraft in the northeast. One of them heard shots immediately before the aircraft broke up. The situation of the others was closer to the aircraft is what they described as "lost."

Efforts were made to obtain exact information from the witnesses regarding the aircraft, at 11°28'N 21°55'E, reported completely possible, no confirmation it has not been possible to place reliance on the bulk of information.

#### (c) Various Eye-Witnesses

(Point "D") on the map. In the light of the evidence of the witnesses, both Yugoslav and Greek, the circumstances of the aircraft's disappearance are now being continued from the point "D."

### Precision Loss

As mentioned before the aircraft was presumed to have continued to the Yugoslav-Bulgarian border without further mission. The distance from the point "D" to the mountains (11°28'N 21°55'E) was which it first appeared to the Greek witnesses is 11°28'N 21°55'E.

The mountains is about 8000 feet high and the aircraft was described as coming in over it. We estimate therefore, an altitude of some 8000 feet.

As the aircraft had reported in 10000 feet over the point "D" it must have lost, approximately 1000 feet of the altitude over a distance of 17 kilometers. This means that the aircraft must have reduced speed to the mountains in order to make a rapid descent. It must have entered steep descent 180 km over the distance which it would have covered as "normal" banking at over the mountains at 1500 ft.

Loss of precision is a result of

damage to the fuselage caused by one of the earlier bursts of fire may account for the very rapid descent. (It will be remembered that the Yugoslav witnesses heard machine gun fire before the aircraft came into view.)

In the Yugoslav witnesses heard fire when the aircraft disappeared from view and the Greek witnesses heard fire just before the aircraft appeared smoking into their view, it means that the aircraft was hit for a second time as it was reported in the aircraft came over the mountains.

The SOS message was received at 0112 which would be immediately after the fire started.

Why no SOS message was received either is a matter for conjecture. The cause of the sudden loss of precision may not have been immediately apparent to the captain, and had some would have been in line height it would be possible at the same time he would have tried to lift out of the case of the loss of precision. It may be that it was only at the second attack that he realized that the aircraft was under fire.

The aircraft continued its north-easterly direction by the two fighters. It was being highly steadily. After crossing the border then it turned left between P-51s and the Greek border. It then headed in a southerly direction towards the Yugoslav valley and it crashed on hills 218 and 281.

Right up to this point the aircraft appears to have been under control and the pilot was making for a landing in the Western plain and possibly in the abandoned military aircraft north of the hills. One of the fighters accompanied the aircraft to the end.

From the report of the wreckage and technical investigation it can be seen that serious damage was inflicted on the aircraft before it crashed.

Explosion of high caliber projectiles in the rear part of the fuselage damaging the control mechanism of the elevator and rudder would have prevented the aircraft to maintain controlled flight.

### Wing Explodes

Furthermore, projectiles had penetrated the tanks of the right wing and it was also from the north of the point that the wing had exploded as stated. The left wing tanks had also been hit by bullets which must have caused a fire, followed by an explosion.

The technical investigation points to the aircraft being ignited and breaking up over the hills in the south of a fuel attack. The eyewitness evidence supports this conclusion. Nearly all of them saw the aircraft break up in mid-air and some saw a lighter accompanying it. The witnesses in the north and south of the hills did not see either the explosion or gas fire. There is a table further in the card which the factors behind the explosion of some of them also based on this.

The failure of some of the witnesses to hear the sounds of the explosion and gas fire may be due to the strong westerly wind which was blowing at the time.

From the evidence of the wreckage and the eyewitness descriptions of the break-up of the aircraft it is probable that

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## SAFETY

The plane was strangled by two Bulgarian soldiers which had been ordered to leave the plane to land at some Bulgarian airport.

The fighters missed the airplane, in one instance with unexplained unexplained reasons, to land. In spite of this, the plane did not stop but continued to fly south, trying to fly across the Bulgarian border.

Under these circumstances, the two fighters, belonging to the Bulgarian Air Force, belonging to the Bulgarian Air Force, attacked by the cockpit of the airplane, which, in a result of which a life later, the aircraft took fire, and fell in the region of the town of Petritsch.

Adopting the conclusion of the Special Governmental Commission, charged with conducting the report of this case, the Bulgarian Government states that the cause of the catastrophe accident of the T-19 aircraft can be summarized as follows:

(1) The plane did not follow its trajectory; it violated the frontier of the state of Bulgaria and, without any permission, penetrated deeply into Bulgarian air space.

Equipped with the most perfect means of aerial navigation, the plane could not but have known that it had violated the Bulgarian frontier. Even after having been warned, the aircraft did not obey orders but continued to fly toward the Bulgarian-Greek border.

## Certain Hosts

(2) The Bulgarian Air Force Defense Troops exhibited a certain haste and did not take all the necessary measures to force the airplane to land in their air space and land.

(3) The Bulgarian Government also holds that it is necessary to recognize the circumstances that for many years, contrary to the conclusion of the investigation of the People's Republic of Bulgaria, was held against Bulgarian borders.

During several years, the flight of the plane across Bulgarian borders have been made by means of unknown aircraft. During these flights, it was frequently equipped with arms, sub-machine guns and other equipment, were penetrated into Bulgarian territory.

The Government of the People's Republic of Bulgaria has persisted in an effort to ensure the respect of the United Nations, of which aircraft violated the frontiers. This created a serious, unpleasant, and complicated situation, because the aircraft, which was not to be taken to the security of the State. It is as such a true airplane that the sub-machine guns in the State airplane, become possible.

The Government of the Bulgarian People expresses our most sincere personal regrets for the great machine which has caused the death of one of our people's innocent persons. The Bulgarian Government already knows that such catastrophes should never be repeated. It shall investigate and punish the persons guilty of the catastrophe which occurred on the bank airplane and it will take all necessary measures to ensure that similar catastrophes shall not be repeated in Bulgarian territory.

The Bulgarian Government expresses its profound regrets to the victims and it made to ensure the payment of damages due to their families and will also pay for damage to equipment.

Text of the Minister of Foreign Affairs, People's Republic of Bulgaria, Sofia, August 4, 1955.

## REPORT ON WRECKAGE AND TECHNICAL INVESTIGATION

At the total time spent on Bulgarian territory by the three wreckage was only slightly more than seven hours and of which about 30 hours were spent on land and about 10 hours were spent in the air.

The location of the wreckage was seen by the Greek/Bulgarian border on the Greek territory about 9 km. N. E. of Petritsch. The wreckage was found on the hill 724/230 on the western bank of the river Stremos. The wreckage was not found on the S. E. and N. W. directions of the hill as it was of approximately 15-20 m. radius. The topographic height of the hill is 232 m.

## The Southeast Side of the Hill

The ruins part of the wreckage was on the S. E. descent of the hill. The aircraft debris was found scattered, some parts broken into thousands of fragments. It was impossible to connect all the parts.

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### SAFETY

which were lying around. Therefore, only those parts were examined, which up to the present of the extensive appraisal sufficient.

The following parts and components found in this area were noted:

1. Four engines. One engine had been disassembled and many parts had been removed including 17 of the 15 cylinders. A second engine was found in the water near the river bank. A third engine was in the river just upstream. The fourth engine was on the shore of the lake.
2. Two parts of the control section of the fuselage were found partly in the water. They were punctured by numerous small pointed metal and paper balls of various sizes. Indents being visible coming from the holes were and were scattered on the ground. The large cleared no sign of fire.

The part of the fuselage was the section which the wing was attached. There were several holes in the fuselage that had penetrated into the cabin in the vicinity of the right heater compartment. These holes were several inches and small holes in the right heater compartment situated in the right wing root. Part of the heater assembly in the front of the heater compartment of the fuselage was missing. It had not broken off by impact but had gradually been disintegrated.

### 'Blow-Down' Fire

In the heater compartment there was a clear indication of a fire in flight with a blow-down effect. Numerous small parts had melted away with disintegrating effect along a straight path against the direction of flight.

3. The left wing broken off from the fuselage at the wing attachment fitting, was lying on the ground in one piece. The underside and side of the wing had been partly melted by fire. Nearly all the wing had been cleaned off. Part of the wing was left, including damaged but not broken down parts of the wing and lower wing that were melted off.

There were a number of papers and small debris in what remained of the wing skin.

In the case of the upper surface of No. 7 tank, just below the wing spar, there were several pointed holes. In the rear spar web, at approximately W15210 there was a small round puncture, measuring 14 mm in diameter.

4. One complete underswing, sub-wing, in fabricated position, was found in the area.
5. The steel assembly of the second underswing was on the outer bank of the river.

The only radio equipment found with two radio sets badly melted. There were no radio sets.

6. On the underswing there was only one radio compass showing a heading of 114° and a needle swing of 50°.
7. Some dental seat cushions were found but their associated web for a small part of all the seats. The seat were missing. A partly burned safety belt

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9. Two propagule holes were found on one of which there was an entirely new propagule.
10. An additional large fungus hole of about 5.000 holes remaining on the western bank of the river, was found - several of which were in the bark of the twigs. The wood-borer holes were on the side one of them strongly beveled.
11. On the main panel, leaving the forest, the first hole was in the trunk of the tree. The hole of the fungus hole, one was found a vertical crack. It was pierced by 12-15 small holes up to 15 mm.
12. Many smaller pieces being spread out specified above were pierced by round and irregular holes.
13. The small mushrooms on the ground where heavy parts had been indicated but the parts were found only a distance away, scattered in the bushes.

### The Northwest Side of the MCI

On this side the sealings was more widely scattered than on the northeast side and consisted mainly of major parts.

13. The right wing was broken off at the attachment flange from the fuselage and broken in three large parts which were lying at a distance of about 30 m one from another. At the inner part of the inner wing, the skin was seen rent from the low air maneuvering. The tank area of this part of the wing, between the front and the rear spar, was almost entirely burned out and the metal of chords and extrinsins was melted down.

The motor holds the wing skewed a few inches down but also holds it by the remaining fuel of the wing at the base of the impact.

In the motor part of the motor wing, in the vicinity of the engine nozzle, there was some indication of a big explosion and there was less destruction than in the other part. (Since it was still possible to find and identify some holes caused by the penetration of projectiles [some of these were of large caliber].)

The outer wing carrying the skid was also damaged. Here, there was a fire of great intensity. The fabric was stripped clean from the skid which exposed an area of five

Patents Served

14. The faultage between the wing trailing edge and the rear pressure bulkhead was washed into several places, all of them strongly distorted and almost beyond recognition. Here again, a number of holes of different sizes were noted. All five glass and fabric layers of the accessible column sections were stripped from the inside of the faultage. The steering column button box cover was found unscathed and sound.

15. Three bladders were found near the foreleg, each packed into a tight plug-like bundle. The middle end of each bundle was closed.



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For further details write M. L. TAYLOR  
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pressure bulkhead. There was an in-  
ward pointing hole on the lower part  
of the right side of the bulkhead.  
The hole was fitted with a plug with  
a maximum diameter of 30 mm. The  
direction of penetration was approx-  
imately 31° from the axis to the hori-  
zontal plane line of the aircraft. No  
corresponding defect in the hole could  
be found.

The rear pressure bulkhead in this  
part of the fuselage however was joined  
by a great number of round and jagged  
holes most of them pointing outwards.  
There was also a large opening hole in  
the pressure bulkhead.

The bottom segment of the round  
wing from the left side attachment  
point was joined by two holes from  
the rear to avoid measuring 65 mm and  
71 mm respectively.

The welding beam of the elevator  
was found detached from its bracket.

The fuselage structure in the area of  
attachment of the wingpans showed a  
number of holes.

On the bottom of the fuselage in  
detachment the welding beam attachment  
brackets there was a jagged opening in  
the skin with a diameter of 170 mm.

There were indications of a serious  
crack in the fuselage structure. The  
wing bracket system appeared to be  
attached to the fuselage structure of the  
main fuselage section and the wing-  
pans bracket system including the  
connection structure in this area.

16. The wingpans of the aircraft were  
broken into three pieces which were  
found 140 meters apart.

Most of the structure and the rivets  
in wing were found in the fuselage at the  
left. A smaller part of the structure  
with the left fuselage rivets was found  
to the top of the fuselage. The right part  
of the structure, the rivets and the  
right fuselage rivets were found in the  
bottom of the fuselage and several  
pieces of the structure including the  
fuselage had been cut into with cutting  
tools and could not be found.

In the structure of the wingpans,  
where it attaches to the fuselage, there  
were a number of holes.

17. Decal sheets were clearly cut by sharp  
instruments and some of the material  
of regular rectangular shape was  
missing.

18. The two high pressure engine baffles  
and the low-pressure engine baffle were  
found intact.

19. Many major components and systems  
could not be found. Unaccountably  
missing was the section of the fuselage  
from section 218 forward which is  
called the nacelle.

20. In addition to the holes mentioned in  
the above description there were many  
other holes of sizes ranging from 5 to  
25 mm.

21. Despite the large number of holes no  
penetration or disintegration of properties  
were found.

### Discussion

The first number used in this Decree  
was also the number in the Decree  
from 5 above.

1. Nothing was found in the wreckage

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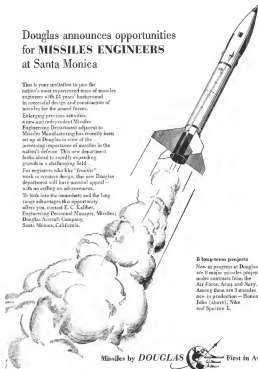
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variable for inspection to indicate that there have been any defects or failures due to malfunctions.

2. There was considerable evidence that the workers had been informed earlier before the committee arrived. It had been noted that some parts had been removed, working tools, all radio equipment and instruments. There may have been useful information.

In addition, many parts had been discarded, not used and/or resused. Among these were organic residues (Item 1), littered leaves (Items 3, 14), the body (Item 2), most of the shell (Item 7), portions of the carapace (Item 10), debris boats (Item 9), and the whole of the cocoon (Item 11).

Furthermore, marks in the ground indicated that heavy parts had been shifted from the positions in which they had fallen. At least part of the material above sheet could not have been consumed by rotting vegetation.

In spite of the extensive interference with the wreckage it could be determined that some of the parts were long when they had failed. For example, the three pieces of the right wing were in their original position. This was clear from the fact that the fire had burned up one of the pieces intended to be at present repositioned and verified evidence from all three pieces was lying in its position beneath the pieces from which the metal had melted away.

### Fire Nature Explosions

3. There was a clear indication of a fire having started some time before the first burning and having continued in flight for several minutes. The evidence for this was the condition of the heater coil, the paint. The fact that there had been some time in flight in order to have melted the aluminium along a straight path running from back to front. The melting of the aluminium occurred along the path. The fact was indicated by the direction in which the fire was exposed by means of the holes in the construction.

The use of the projection that had entered could not be determined owing to the deformation of the material through heat and impact.

- [illegible]



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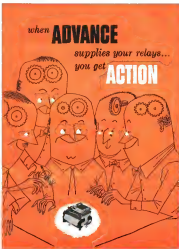
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reflected, occurred at, or immediately before the final breakup.

4. There was evidence that the right wing had exploded and that the explosion had taken place in mid-air. Rivets holding the ribs to the skin had been sheared off. The three pieces of the wing were lying at a distance of about 50 yards one from the other.

5. To explain before the pieces were shown they had acquired, before and could not have been in which entered except by and/or explosion.

7. The numerous holes in the cargo compartment panel were caused by bullets of different calibers. This was caused by movement with velocity from the photo gallery. Its diameter was 14 cm.

These holes were round and the panel they penetrated had been in a vertical position. They must therefore have been caused by bullets fired from a direction more or less horizontal to the aircraft.

8. The rear part of the fuselage (from 17) was heavily pocked by holes, including some of large diameter.

One of these large holes was caused by a projectile entering the unprotected part of the fuselage at an acute angle from the rear. It must have then exploded, cutting the main inward girding ribs in the star and the forward fuselage ribs in the star position. It must have been fired from the rear (from 17) and the angle of penetration it can be concluded that the projectile was fired from an aircraft. It was not a machine gun shot, as it was not a bullet.

The two ribs in the second row from the tail end in this area were also covered by large rubber projectiles. They must have been fired from the rear.

The damage they caused could not be clearly determined. They may have brought about the detachment of the trailing beam. They may have also caused the fire which caused the emergency landing system.

The explosive effect of these three large projectiles behind the rear fuselage indicated, when read of the electrical and rubber control mechanism is situated would prevent the aircraft from being flown under control.

9. The report to the Bulgarian Government to allow a second access to the wreckage, of a committee of two, including the aircraft expert, was not granted. The wreckage was used at it to the top and out of perspective which led the aircraft was reached by the Commission. They were not permitted to photograph and sketches and had covered reports on this aspect of the investigation. However, the aircraft of the Commission also had had access to the wreckage.

## Conclusions

1. Since the bullet hit final breaking the aircraft continued to fly, or to fly, which caused loss of consciousness and a fire in the cabin compartment.

2. The aircraft broke up in mid-air. The cause of the break up was explosion due to bullets hitting the right wing and probably, the left wing further north a projectile or projectile of large caliber landing at the rear end of the fuselage.



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Pan American World Airways has ordered 20 Boeing 707 Stratoliner, for delivery late in 1963, and scheduled service in the following spring. Here are some of the proposed flight lines:

New York-Pan, 4 hrs. 45 min.  
Chicago-Los Angeles, 4 hrs. 45 min.  
San Francisco-Tokyo, 10 hrs. 45 min.  
San Francisco-Alaska, 11 hrs. 10 min.

## FIRST jet transoceanic service!



American Airlines has ordered 30 of the new Stratoliner. Delivery is to begin early in 1962 and regular service in June, 1962. Here is how American's Stratoliners will connect United States destinations:

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# BOEING Jet Stratoliner

## AIR TRANSPORT

### Examiner Urges Tigers, Slick Renewals

Mail and air express carriage would be permitted without subsidy payment for seven-year period.

By Craig Lewis

Washington—Renewal of the certificate of Slack Airways and Flying Tiger Line for seven years has been recommended by Civil Aeronautics Board examiner James S. Keith in his report on the east-west phase of the Air Freight Renewal Case.

Keith also advised the Board to allow Slack and Flying Tigers to carry air express and mail with a restriction against intraday.

Keith found renewal of the route pattern of both all-gate carriers on two percent rates was basic, with cut rate modifications.

Effect, the Board noted a decision in the second round trial phase of the Air Freight Renewal Case, in which Riddle Airlines and American Air Express and Impact Co. were certificated for five years (AW Nov. 23, p. 167).

In the North-South Case, CAB authorized Riddle and AANCO to carry air express, but deferred their applications to carry mail for decision in the East-West Case. Keith recommended that the CAB authorize all four of the all-gate airlines to carry mail.

In recommending renewal of the Slack and Tiger certificates the examiner finds that "the beneficial results of the air freight experiment, the future of the air freight market and the status of the all-gate carriers in fostering its development, as well as the world-wide use of such carriers in making available additional facilities for military needs and charters and special services, require the renewal of the air freight experiment for a further test period."

#### No Subsidy

Keith feels that while the record in the East-West Case is more concrete than it was in the North-South Case, Slack and Tiger haven't shown conclusively that all-gate services can be operated profitably over any extended period, even with assistance of rebates (ENR). Until this rule can be shown, the examiner said, they have not laid a foundation for permanent certification.

Referring to the rate of transportation of mail, Keith feels that in view of benefits to the postal service and the small amount of diversion likely, the cargo airlines should be permitted to

carry it. "The report finds that such an authorization wouldn't cause the Government in subsidizing the operations of the four cargo lines involved."

On the air express route, the examiner compares the Railway Express Agency to the air freight forwarders and finds that since the forwarders are not permitted from using the service of the cargo airlines, the Railway Express Agency shouldn't have such a restriction.

"There is no more prohibition for forwarding or express in a separate category of property, simply because of its identity than there is in regarding air freight handled by the air freight forwarders as a separate type property," he said.

When a carrier is authorized to engage in the transportation of property there should be no inhibition in such authority as to items or classes of property, in the absence of strong reasons of public interest. In the present case there are no such reasons.

Keith feels that "if an express service is available and Slack's and Tiger's schedules meet the requirements of the Railway Express Agency, there is no reason why they should not have the opportunity to carry such traffic."

#### No Prediction

He pointed out that Riddle and AANCO have already been authorized to perform the service.

"The report points out that renewal of the restrictions won't accomplish the job of putting air express on the cargo lines, since REA and the passenger airlines have an accepted prohibition against such service. Keith suggests that as appropriate precedent be continued if the agreement isn't modified voluntarily."

The examiner feels that the future of air freight lies in volume shipments and depends on the ability of the carriers to bring rates into a competitive position with surface cargo rates. Two important factors will be the development of more economical equipment and better penetration of air freight as a standard means of shipping.

### Route Recommendations for Slack, Tigers

The SLACK certificate would be restricted to air service between points in two city groups. They are:

- Los Angeles, San Francisco/Oakland and San Diego
- Phoenix
- El Paso
- San Antonio, Houston, Fort Worth/Dallas, and Oklahoma City
- Albuquerque
- Wichita and Kansas City
- Fairbanks
- St. Louis, Indianapolis, Cincinnati, Louisville, Detroit, South Bend, Chicago, Toledo, Detroit, Cleveland, Akron and Columbus

- Nashville
- Philadelphia, Hartford/Springfield, Boston, Providence, New York/Newark, Philadelphia, Wilmington, Baltimore, Washington and Baltimore

In the Slack certificate, Keith proposes to have Phoenix, Albuquerque, El Paso, Wichita, Kansas City, Oklahoma City, Portland and Nashville serve on a demand basis. Baltimore, Akron, Toledo, Columbus, South Bend and San Diego could be served by mail to the nearest regularly served airport.

The FLYING TIGER LINE certificate, recommendations detailed service between two groups of cities:

- Los Angeles, San Francisco/Oakland and San Diego
- Portland and Seattle
- Salt Lake City, Denver and North Platte
- San Antonio and Omaha
- Akron, Chicago, Cleveland, Detroit, Grand Rapids/Michigan, South Bend and Toledo

- Atlanta, Birmingham, Boston, Buffalo, Hartford/Springfield, New York, New York, Philadelphia, Providence and Rochester

The Flying Tiger certificate would have the conditions that service to Salt Lake City, Denver, North Platte, Omaha and the Western be provided on a demand basis and that Providence, Albany, Rochester, Akron, Toledo, South Bend, Grand Rapids and San Diego could be served by means of truck to the nearest regularly served airport.



First Flight of the 'Seven Seas'

The DC-9C, Douglas Aircraft Co.'s newest long-range transport, made its first test flight last week, a two- to four-hour flight over Southern California. The aircraft, which can carry up to 85 passengers and cruise at 358 mph, is scheduled to be flying transoceanic routes by late summer. Orders for the "Seven Seas" already have been placed by 10 U.S. and foreign airlines.

## Scheduled Lines Protest Nonsked Ruling

Washington—Scheduled airlines have filed strong protests with the Civil Aeronautics Board against the decision in the Large Irregular Case which set up rules for a new class of Supplemental Air Carriers.

Deputies were filed in all terms of the decision, but the scheduled carriers asserted their line on the non-scheduled line flight rule which permits a limited scheduled operation.

The carriers also attempted to persuade CAB to extend the deadline for filing petitions for reconsideration and extend the effective date of the new authorities which are now Jan. 1, 1956.

The CAB majority which set the terms of the large irregular decision has refused to extend the deadline and is proceeding with action on the reconsideration petitions.

### 'Egregious Error'

A federal appeals court could have had a substantial effect on the decision, says member John Lee Lewis the Board Jan. 1, and Chairman Ross Rabe is reported having to accept a federal judgment only in January. Both are members of the majority in the Irregular Case. Any shift in the philosophy of the new Board could mean a

radical change in the decision if action was put off until after the first of the year.

Protesting the denial of a time extension, American Airlines described the Large Irregular Case as larger in scope, economic impact and not at all decided than any other previously denied by the CAB.

The carrier said a basic fault in the majority opinion in the case is that it is "grounded on a state of facts that doesn't exist."

"The needed evidence it describes is imaginary," American told the Board. "The opinion fails to take into account the fact as to what has gone on, as disclosed by the record, among the airlines."

American contends the CAB majority is not aware of the effect of the new flight rule. The carrier says that "once airlines are given the right to provide regularly scheduled service whenever they choose, feed and advertised in advance, even though limited in amount by any one of them, the door is wide open to the pursuit of daily service by groups of airlines, possibly duplicating regular scheduled service, without any demonstrable collision with service."

United Air Lines described the CAB action as an invitation to the irregular carriers to "get themselves in traffic markets whose resources are required for maintenance of the national air transportation system."

In its petition, United said designation of a specific national limit on individual passenger flights won't solve the problem of abuse in irregular carriers of the Act. The carrier feels that such a regulation "cannot ensure the complete compliance to maintain route type operations and to engage in abuse practices toward an innocent traveling public."

TWA World Airlines questions the use of the Board's complete authority in the decision. The TWA petition said that the use of the blanket exemption to permit 49 irregular carriers to engage in route-type operations constitutes a significant departure from the controlled entry principle. TWA told the CAB its action represents an abdication of the statutory intent of its carrier regulation and is a double-edged sword to law and the purpose and intent of the Act.

TWA maintains that the threat of the majority that the new flight rule will provide needed entry capacity dis-

ting port traffic capacity is based on a misconception. Pointing to the North American and Skunked carriers, TWA said that the irregular carriers operate in high density markets on a daily basis, regardless of the spot availability on a particular carrier.

TWA also objects to the authority granted the irregular carriers to carry cargo in international operations. The carrier feels that the public carriers which kept the Board from authorizing the irregular to carry passengers overseas apply to cargo.

### Cargo Authority Objections

For American World Airways also objects to the international cargo authority. For Am points to absence of change across the Pacific and the presence of only one U.S. all-cargo carrier in transoceanic service in indication that there is no need for further capacity in transoceanic business.

For American agrees with the TWA contention that the same reason which kept the Board from authorizing indi-

vidually selected passenger operations in international service should serve to eliminate scheduled cargo operations for irregular carriers. Basically, the Board divided not to authorize the passenger operations because it felt new cargo facilities would be scarce for carriers which still require subsidy.

National Airlines told the Board that the same of the irregular claim is only proper in the sound development of the air transport nation in its request for reconsideration. National also feels that the CAB action will impair the ability of the market to seek carriers to substitute future periods of economic adversity without injury and from the government.

The impact of the newly authorized operations will be especially serious with cargo, because, according to the petition, the carrier points out that most of its revenue comes from traffic between major ports in Florida and the Northeast and that irregular carriers have found these routes attractive in the past.

In 1949 in December 1946, with the other four being delivered after that at the rate of one a month. The fleet, along with six last present 1949 DC-4s, will provide the airline with an annual cargo weight of about 200 million tons. Each 1049 DC-4 can carry 19 tons payload on the North Atlantic, a ton more than the 1049 D Super Constellation's 18 tons payload capacity. It believes that the Super Constellation is an economical plane for its present needs.

Seaboard's decision to buy additional 1049s takes it out of the picture as a possible purchaser of American Atlantic's DC-6As.

The carrier should benefit directly from the British airline's decision to step out of the transoceanic range field, because had seaboard plans to move backload goods across the ocean by air, a field that Seaboard also considers very lucrative.

## New Denver Decision Sought by Airlines

Washington—Denver winning new service and route awards in the Denver subway decision has returned to the Civil Aeronautics Board seeking modifications in the decision.

Here are the individual arguments:

- **American Airlines** wants the Board to lift the restriction requiring San Francisco/Oakland flights by stop at Chicago, authorize non-stop service between Denver and Los Angeles and to eliminate the off route restriction on transcontinental operations to and from San Francisco.
- **TWA World Airlines** acquiesces CAB to remove the restriction in the newly authorized Denver service prohibiting St. Louis/Chicago and Kansas City/Chicago operations. TWA further wants a waiver against United Air Lines/Kansas City award to prohibit Kansas City/Los Angeles service and has strongly urged a reversal of American's recommendation for Chicago/San Francisco.
- **United Air Lines** wants a modification of its Kansas City award to be allowed to serve both Chicago and Denver on transcontinental flights through Kansas City. Regarding the route restriction, United particularly objects to the proposed service of Continental Air Lines, Western Air Lines and American. United's petition asks CAB to reconsider and state the City of Chicago's authority to restrict entry between Chicago and San Francisco/Oakland. They also challenge the validity of the award to Western of a route between Denver and San Francisco/Oakland, and the Chicago-Los Angeles non-stop authority given to Continental.

## Airwork-Atlantic Quits U.S. Route; Seaboard Strengthens Position

The Atlantic's only two scheduled all-cargo operations moved in opposite directions last week, with one being held entirely and the other strengthening its position.

• **Airwork Atlantic, Ltd.**, moved operations to the U.S. and Canada after less than 10 months service, claiming that lack of support from the British government prohibited a possibility of making a profit on its route.

• **Seaboard & Western Airlines** strengthened its transatlantic position by acquiring three additional Lockheed 1049 H Super Constellation transports at a cost of \$5.5 million. The airline says, Seaboard's total 1049H orders to five airlines added to \$10.5 million.

Airwork-Atlantic spokesman turned the carrier's claim on an "air traffic struggle for British airlines." The airline had been led to believe, he said, that the British government would provide some backing by allowing Airwork-Atlantic to carry mail and passengers as it had its routes established. By continuing to restrict the operations to cargo on its three times a week transatlantic operations, revenues were insufficient to maintain the carrier's flight as an international line, he said. The carrier particularly felt the restriction on passengers during the summer months, when travel is at its peak, cargo shipments drop off.

The company had been told by the Minister of Civil Aviation that new legislation would be required to change its operations. The earliest that such action could begin would be in July, and American apparently felt that, even then, government support of such a venture would be lacking.

The company cited other restrictions placed on the Atlantic operation such as placement of 24% import duties on the three DC-6As, freightage it had to collect on cargo, and the carrier's order in the import bill that freed British Overseas Airways on its aircraft passengers. Lack of government support in extension of routes was not cited.

American is negotiating to sell the three DC-6As. Although company officials declined to meet the press on the matter, the first DC-6A is scheduled for delivery in January, the other two in March. The carrier also had been negotiating to purchase United States air transportation cargo planes, but "this is now dead," the spokesman said. In another move, American will lift the first of New York Authority to release it from its obligations on 7,000 sq. ft. of space at New York International Airport.

On its transatlantic operations, Airwork had been losing a DC-6A from Stockholm and new DC-6As from London. Seaboard, with losses leading service since. For the week ending Dec. 3, it reported 22.22% of the transatlantic scheduled all-cargo flights and carried 35.2% of the air freight, a total of 64,900 lbs.

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## Congress Should Investigate CAA

A congressional investigation into the Civil Aeronautics Administration only next year is now certain. Sen. A. S. Mike Monroney, a Democrat from Oklahoma who is chairman of the Aviation Subcommittee of the Interstate and Foreign Commerce Committee, will speak the invitation.

Sen. Monroney is now interested mainly in whether civil aviation is being crippled by a "misled demerit" group of top level Commerce Department officials and whether recently-issued CAA Administration Frederick B. Lee was a merit in this case.

While there was evidence that the future growth of aviation was being hampered by budget-cutting policies during the last years of the Eisenhower Administration, that policy has switched in the face of the growing crisis in air traffic control.

### Official Alarm

Top level Administration officials including those in the Commerce, Defense and Budget Bureau bureaucracies are now thoroughly alarmed over the civil and military consequences of the rate at which air traffic is outstripping the system for identifying and controlling it.

When he concludes his investigation into CAA, Commerce Department relations we strongly recommend that Sen. Monroney direct the effort of his subcommittee to probing the causal crisis in air traffic control. If he can develop a complete and accurate record on the history of this crisis plus present and future plans for handling it, Sen. Monroney will indeed be doing his fellow accident of Congress and the American people a real service. For, as we have emphasized before, this problem directly concerns every American citizen who buys an airline ticket or who pays Federal taxes for the support of effective military aviation.

### Questions for Probers

Here are some of the questions Sen. Monroney and his colleagues should ask Secretary of Commerce Stephen Wozniak, Under Secretary Louis Rothchild, the new CAA Administrator Charles J. Lown, his predecessor Frederick B. Lee, and other witnesses from the Air Coordinating Committee, the Budget Bureau's Harding advisory group, the Air Navigation Development Board and the Pentagon:

Why has the Civil Aeronautics Administration airways and air traffic control system consistently lagged far behind the growth of air traffic?

How much of CAA's current and future planning for airways equipment duplication equipment already in stock or budgeted by the Air Force and Navy?

Why does the CAA shut off its traffic control radar

at the highly congested Chicago, Washington and New York airports when it says and the traffic control problem is worst?

Did CAA have any electronic airways development plan at all until early this fall?

Did top level CAA officials juggle air traffic figures at since experts to justify an irrelevant landing system installation where actual traffic did not justify it?

Were these airports in political districts where CAA sought congressional support for its policies?

Did this device deprive heavily congested areas of dual ILS installations actually needed to handle current traffic loads?

Why does London Airport have dual ILS installations and multiple high intensity approach light installations when no major U. S. airport is so equipped?

Why are there five different approach light systems currently installed on U. S. airports?

How and why did the Special Working Group 13 (SWG 13) of the Air Coordinating Committee come into existence?

Why did a CAA traffic controller write that he was "tired of continually writing letters to the regional administration explaining our cases" of air traffic due to faulty operations of his control center?

Why do experienced CAA traffic controllers transfer out of overloaded centers to areas where traffic is light?

What did the Harding advisory group report to top level Budget Bureau and Commerce Department officials on the effects of the air traffic control problem on civil and military aviation?

Is it necessary to establish a special air traffic control agency operating both Federal airways and traffic control centers and the military air defense warning net to furnish both CAA and the military with the air traffic data they must have to perform their respective missions?

What will it really cost the taxpayers in effective air defense, air transport safety and dollars if the CAA and the Pentagon fail to develop a common electronic airways and air defense system that will meet the requirements of expensive interception and jet interceptors?

### Future at Stake

There is a fertile field for congressional investigation along these lines. For it is Congress that will have to authorize any new legislation and appropriate the billions for the establishment and operation of the new system. Congress and the American people are entitled to know the facts on this growing crisis in air traffic control for it vitally affects the economic and military future of our nation.

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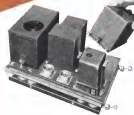
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